



Robotics and ICT at school



Erasmus+

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0.- SCHOOL/ORGANISATION CONTEXT.

School/Organisation context: Primary Spanish School. SPAIN (CEIP Blas INFante & CEIP Hermelinda Núñez)

- Ages of phases of education: Primary (5-12 years old)
- Specialist (ICT/Maths/DT) or generalist teachers/teaching assistants? All teachers teach Digital Competence, some specific teachers ICT.
- Whole school or targeted CPD? In-house or external
- Any extra funding? n/a
- Status of curriculum
Schools' own
Local/regional/national curriculum.
Mandatory or guidelines
Intervention/offer/ client's choice

School/Organisation context: Ermington & Ugborough Primary School. ENGLAND

- Ages of phases of education: Primary (5-11 years old)
- Specialist (ICT/Maths/DT) or generalist teachers/teaching assistants? Teachers teach all subjects across the curriculum
- Whole school or targeted CPD? In-house or external
- Any extra funding? n/a
- Status of curriculum: National Curriculum for England

School/Organisation context: Bohrskolen Denmark

- Ages of phases of education: (5 - 16 years old)
- Specialist (ICT/Maths/DT) or generalist teachers/teaching assistants? Maths, Science, Language, etc.
- Whole school or targeted CPD? Whole school, both primary and secondary school.
- Any extra funding? Extra funding to the project: Novo Nordisk Foundation: 25.000 Euros
- Status of curriculum:
In Denmark we have a national curriculum for each subject (maths, science, etc.) We do not have any specific curriculum for ICT, robotics or programming.
Each subject has to integrate ICT, and we have the possibility to bring in robotics and programming to ease the students learning in maths science, language etc. We are planning to make a local curriculum for Bohrskolen related to robotics and programming.

School/Organisation context: PO "Galiu kitaip" Lithuania

- Ages of phases of education: (5 - 16 years old)
- Specialist (ICT/Maths/DT) or generalist teachers/teaching assistants?: mentor of LEGO robotic activities.
- Whole school or targeted CPD? PO "Galiu kitaip" mane activity - LEGO robotic lessons. Second activity - collaboration with primary and secondary schools for making lessons interesting. Subject: maths, science, language, etc.
- Any extra funding?: There is not.
- Status of curriculum:
In Lithuania we have a national curriculum for each subject (maths, science etc.) We do not have any specific curriculum for ICT, robotics or programming.
Some subjects have integrated ICT, and we have the possibility to bring in robotics and programming to facilitate the students learning in maths, science, language, etc. Collaboration with schools has already begun, but it is only in the first steps. We have plans to have more lessons and to involve more teachers to show them the possibilities to make maths or science interesting and more practical.

School/Organisation context: Primary Maltese School. MALTA

The Maltese school: no data provide.

1.- Core curriculum.

Each country has a core curriculum, in this case, these schools are going to focus on ICT. Now, we are going to compare their curriculums about new technologies.

First, we can see information about ICT from the Spanish schools. We see they have a specific competence "COMPETITION AND DIGITAL DATA PROCESSING".

Definition: "Ability to search, obtain, process and communicate information and transform it into knowledge."

It incorporates different skills, ranging from access to information to transmission in different media once treated, including the use of information and communication technologies as an essential element to learn and communicate. It is associated with searching, sorting, recording and processing or analysis of information, using techniques and different strategies to access it as the source to which you go and get support from (oral, printed, audio-visual, digital or multimedia).

- Search, selection, recording and processing of information.
- Transformation of information into knowledge.
- Sharing this information.

This competence must be developed when students work different topics in class.

Then, the British school shows us this information about ICT in the core curriculum.

KS1 Computing (5-7 year olds)

- understand what algorithms are, how they are implemented as programmes on digital devices, and that programme is executed by following precise and unambiguous instructions
- create and debug simple programmes
- use logical reasoning to predict the behaviour of simple programmes
- recognise common uses of information technology beyond school

KS2 Computing (7-11 year olds)

Pupils should be taught to:

- design, write and debug programmes that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- use sequence, selection, and repetition in programmes; work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programme design, write and debug programmes that accomplish specific goals, including controlling or simulating physical systems
- select, use and combine a variety of software (including Internet services) on a range of digital devices to design and create a range of programmes, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

The Danish school says, in Denmark they have a national curriculum to each subject (maths, science, etc.) They do not have any specific curriculum for ICT, robotics or programming. They are planning to make a local curriculum for Bohrskolen related to robotics and programming.

The Lithuanian school has a similar situation to the Danish school. They have a national curriculum for each subject (maths, science, etc.) but, they do not have any specific curriculum for ICT, robotics or programming.

Some subjects have integrated ICT, and they have the possibility to use robotics and programming to facilitate the students learning in maths, science, language, etc. Collaboration with schools has already begun, but it is only in the first steps. They have plans to have more lessons and to involve more teachers to show them the possibilities to make Maths or Science more interesting and practical.

Finally, related to this point, the Maltese school does not provide any data.

2.- ICT students' standards of achievement or success (according to age group)

Students' achievement.

Spanish schools show this in two different ways:

Information and communication technologies.

First cycle (5 -7años)

- Use basic techniques and specific languages (oral, printed, audiovisual, multimedia,...) to ensure information and communication.

With help:

- Identify the basic components of a computer (keyboard, screen, ...).
- Use a word processing application and basic operations (create, open,...)
- Make basic operations with multimedia content.
- Operate in educational websites. Participate and collaborate with educational video games appropriated to their level.
- Collaborate in presenting the results of research conducted in a group with tools on the Web. Use ICT resources (digital presentations, video games, devices,...)

Second cycle (7-9 years old)

- Know the most common vocabulary operating system.
- Understand the functions of some of the most common browsers.
- Use any application with limited autonomy word processing.
- Use of digital learning environments.
- Use multimedia resources to explore real-world issues.

Third cycle (10 to 12 years old)

- Identify the basic components and functions of the personal computer.
- Learn the basic vocabulary of the operating system.
- Use any application of word processing.
- Perform basic operations with multimedia content.
- Use collaborative ICT resources in identifying their surroundings close to simple problems.
- Use ICT resources to develop their own products.
- It shows a positive attitude towards diversity, assessing that digital environments promote the inclusion of different people.

- Recognize institutional websites (library, school,...) and cultural and leisure offers.
- Meet the possibility of consultations, procedures and apply online services.

Information processing

First cycle (5 -7años)

- Start the conventional use of books, including e-books.
- Locate information in different media (CDs, DVDs, digital publications,...).
- Access to a limited number of information sources in the net.

Second cycle (7-9 years old)

- Locate information in different media (CDs, DVDs, digital publications, Internet,...).
- Compare network information suggested by the teacher.
- Select, organize and evaluate information.
- Recognize the boundary between what may or may not be shared on the net.

Third Elementary cycle (10 to 12 years old)

- Use search engines to find specific information on the Internet.
- Apply criteria discriminate and evaluate information network
- Select, organize, evaluate, analyse and synthesize information from a variety of sources and media.
- Apply strategies to maintain privacy.
- The difference between creation and reusing existing materials.

The British school shows these students' achievement depending on their ages:

KS1 DT (5-7 year olds)

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an interactive process of designing and making. They should work in a range of relevant contexts [for example, the home and school, gardens and playgrounds, the local community, industry and the wider environment].

When designing and making, pupils should be taught to:

Design

- Design purposeful, functional, appealing products for themselves and other users based on design criteria
- Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology

Make

- Select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]
- Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics

Evaluate

- Explore and evaluate a range of existing products
- Evaluate their ideas and products against design criteria technical knowledge
- Build structures, exploring how they can be made stronger, stiffer and more stable
- Explore and use mechanisms [for example, levers, sliders, wheels and axles] in their products

KS2 DT (7-11 year olds)

Technical knowledge

- Apply their understanding of how to strengthen, stiffen and reinforce more complex structures.

- Understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
- Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
- Apply their understanding of computing to program, monitor and control their products.

The Maltese school points out that there are no ICT student's standards of achievement or success in Malta.

The other schools don't share any information about this point.

3.- What ICT competences teachers are expected.

When we analyse what ICT competences teachers are expected to achieve, we found different options.

In the Spanish schools they use an online programme "SENECA" for school management, they want to improve it by involving pupils, families and staff (whole school community). The same in English schools, they want to introduce an online programme for school management.

The Danish and the Lithuanian schools agree to integrate ICT in each subject.

Finally, the Maltese school wants to introduce the use of "Beebots" to work on observation and analysis of different actions, these types of activities help to motivate students in the development of different mental processes, skills and core competences.

4.- Family and community involvement.

Family and community involvement is a very important point to achieve a good working environment at school. It is vital to get cooperation from families and all the school community members. For this reason, we can explore different ways to introduce them at school activities.

The Spanish and English schools want to do on-line polls to measure the level of satisfaction with different development activities at school or other interesting topics that the school wants to work on. On the other hand, the Maltese school chose to introduce the "Presence of a Virtual Learning Environment: Fronter mainly used (up till now) for administrative purposes" such as "students' attendance"

In this point, the Danish and the Lithuanian schools do not provide any information.

5.- Technology and enhanced learning.

Analysing this point, we can see that all the schools agree on the option to use different software, programmes and digital resources to improve their students' knowledge and they take an interest in the use of new technologies to learn.

Concerning Operating Systems, using different Windows versions is chosen by almost all of them, as a way to upgrade students learning, except the Spanish schools. On the other hand, the Spanish schools use a specific version of Linux for Andalusia called "Guadalinex".

When we refer to the use of an office suite programme, we can find different choices. Spanish and British schools choose open source software like Open Office, while the Danish, the Maltese and the Lithuanian schools choose Microsoft Office or Office 365.

If we talk about "online learning or learning management systems", all schools are interested in using it with their students, except the Maltese school which does not mention the use of this type of learning.

Finally, the Danish and Lithuanian schools make use of LEGO education software to enhance their students learning.

6.- School's equipment.

If we compare what kind of equipment these schools have in order to introduce new technologies. Some elements are common to all partners, for example, smart boards, laptops or desktop PCs, tablets, etc, some schools in

each classroom and others in a specific place to work ICT, depending on the country. We can also see some specific elements, i.e. beebots...

The Spanish schools have Smart board SDI Computers, laptops, tablets, ADSL or high speed cable connection and educational servers & general servers.

The British school has Desktop PCs in ICT suite and some in each classroom, 20+ Tablets, 20+ computers, interactive boards in each classroom, Beebots, bluebots, Lego Mind storms. Besides, Apple TV's in each class to enable casting from Apple tablets.

The Danish school has Smart board, Interactive projectors, PC's, Laptops, tablets, High speed WIFI and cable connections, Online learning resources and Learning management systems.

The Maltese school has Smart board and computer desktops in each classroom, laptops for each teacher and a learning support assistant. Limited filtered connection.

Finally, the Lithuanian school has Smart board, interactive projects, PC's, Laptops, tablets, High speed WIFI and cable connections, Online learning resources and Learning management systems.

After analysing the school equipment, we realise these schools have several ways to introduce their students into new technologies.

7.- Supporting policies/programmes.

Depending on the country they have different supporting policies or programmes.

The Spanish schools work with School ICT 2.0 (only in Andalusia).

On the other hand, the British school is provided with many desktop programmes and apps on tablets. Lego

The Danish school has a specific support, Fælles mål (National curriculum) in Mathematics and Science, 21st- century skills.

The Maltese school has multiple policies for ICT supporting and programmes.

Finally, the Lithuanian school support is a national curriculum in Mathematics and Science, 21st- century skills.

8.- Resources and reference framework.

All five schools agree on the use of government resources such as:

- <http://www.juntadeandalucia.es/educacion/webportal/web/portal-de-plurilinguismo/normativa/centros-bilingues> (Portal de Plurilingüismo Junta de Andalucía) from Spain.

- uvm.dk (Ministry for children, education and gender equality)

- emu.dk (EMU Denmark's learning portal) from Denmark.

These schools also show some examples of teaching and learning websites for example:

- education.lego.com (Lego Education website)

- learnenglish.britishcouncil.org (British Council)

- mv-nordic.com/dk/lego-education/education.lego.com

- www.tamo.lt (It is a computer system to digitize schools)

9.- ICT within different school subjects.

We can see some ways to introduce ICT at different school subjects. After reading information about core curriculum, we know in Spanish schools they work on digital competence. They introduce it in different subjects, keeping in mind the legal frame (state level) and the autonomous (regional) adaptation of legal frame.

The British school introduces ICT in the computing lessons (DT)

The local curriculum for Bohrskolen (Denmark) will be ready in September 2016. Maths & Sciences are subject to introduce ICT.

The Maltese school introduces ICT according to the legal frame according to the National Curriculum Framework 2012.

"Outcoming: Learning Outcome Framework document (LOF) and Learning Assessment Project Document (LAP)"

The Lithuanian school treats digital literacy in primary education as a cross curricular subject. The local curriculum will be ready in September 2016 (Math & Science)

10.- Communicative competence and programming language.

In this section, we can see that the Spanish and British schools are adhering to the legal frame and/or national curriculum, while the Maltese school says they don't have any programming language.

Finally, no data about the Danish and Lithuanian schools.

11.- Teaching ICT and Robotics' methodology.

Coinciding with the previously mentioned, the Spanish and British schools are adhering to the legal frame and/or national curriculum, besides the Maltese school is adhering to the legal frame and/or national curriculum seen as a cross curricular subject.

No data about the Danish and Lithuanian schools at this point.

12.- Special needs.

The Spanish schools, the British school and the Maltese school agree on three steps to cover special needs.

First, preparation and adaptation of ICT tools and software, after studying their students' needs.

Secondly, using an inclusive approach, where each person will be provided with the necessary support in the classroom independently of the type of need to adapt to the students' diversity.

Finally, introducing collaborative work, encouraging group work and improving student's autonomy to get a common goal.

In relation to this section, the Danish and the Lithuanian schools do not provide any data.

13.- Safe use of ICT.

If we talk about using ICT at school, sometimes families show a cautious attitude because we get a lot information, not all of it good, when using the Internet. Therefore, to avoid this situation, some of these schools show different ways to be safe while students are using ICT.

The Spanish and Maltese schools provide some rules to be safe using ICT such as:

- Parental control. Parents can block dangerous sites and protect kids when they are working online.
- School control measures. In the same way that parents, teachers can block dangerous sites, and keep an eye on their students while they are using new technologies at school.
- Control in educational servers. Some of these servers give us the possibility to use new technologies without being in the net, for example intranet.
- Safe data. Keep safe information about students, families, school,... avoid bad use.

The British school suggests to use:

- A local filtering system for the Internet (South West Grid for Learning).
- Children must be briefed on ICT safety through CEOPS. Child Exploitation and Online Protection Centres resources.

On the other hand, the Danish and the Lithuanian schools don't have any specific rules about this.

14.- Other relevant information.

The schools don't provide any other relevant information about ICT use.



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