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NATIONAL REPORT SPAIN - SP

Intellectual Output 1:
BENCHMARCK SURVEY ON INTEGRATING DIGITAL, CODING AND ROBOTICS SKILLS IN VET SCHOOLS: FROM THEORY TO PRACTICE
February 2017
Partner Organisation I.E.S. MARÍA MOLINER (P8)

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Content

1. Introduction

- ## Description of the project

As ICT spreads throughout our societies, touching more and more parts of our lives, so digital competence has become essential for every individual. We are confronted with ICT technologies from our youngest years when we are starting to learn in school and it supports life-long learning when we have left school. ICT has spread throughout the work place, so that the large majority of jobs now require some form of ICT skills. Furthermore, ICT plays a larger and larger role in our private lives for leisure/entertainment, communication and social interaction, our health and wellbeing, as well as with respect to our participation in society.

The importance of digital competence was recognised by the European Parliament and the European Council in 2006 in its recommendation on key competences for lifelong learning when it identified digital competence as one of eight key competences essential for all individuals in a knowledge-based society. Digital competence was defined as follows:

> *"Digital competence involves the confident and critical use of information Society technology (IST) for work, leisure, learning and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, access, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet."*

Recognising the crucial role of digital competence in today's society, the European Commission's 2010 Digital Agenda for Europe devoted a whole pillar to digital literacy, skills and inclusion. Furthermore, recognising the need for indicators to measure the extent of digital competence in Europe, one of the actions of the Digital Agenda was to "propose by 2013 EU-wide indicators of digital competence and media literacy".

- ## Description/Purpose of IO1

The current report presents a final proposal for a set of indicators of digital competence. To this end, the report tries to find a conceptual framework of digital competence very comprehensive in nature and it is beyond the scope of this action to identify indicators to measure the framework in its entirety.

The indicators used to populate the framework are taken from existing relevant sources of data collection. One of the main sources is the Eurostat Survey of internet usage in households and by individuals, which contains an array of questions on ICT skills and use/activity covering many of the competence areas and competences identified by the DIGCOMP framework. However, another important source for indicators relating to digital competence for learning is the recently completed study "Survey of schools: ICT in Education". We complete these indicators with an internal survey done among students and teachers.

- ## Importance of the project in SPAIN

The expansion of the robotic work force has totally transformed industry as well as others very important production fields all around Spain. Automated machines have taken

over the duties of monotonous, dangerous and repetitive jobs from humans, increasing at the same time the productivity. To highlight some examples: industry has implemented robots in some of its dirtier jobs to deal with waste disposals; medical industry benefits from advancements in assisted surgical robotics that permits more accuracy and efficiency; the army uses successfully robotics technology in unmanned aerial surveillance vehicles that are controlled from vast distances; farmers have taken advantage of new technology with automated harvesters…

Programming and robotics teaching is a reality more common than we think. Everybody agrees the importance that children start to use IT tools from early ages but the challenge for parents and teachers is sometimes very high.

So, we should study and modify our educational syllabus from the very beginning in order to prepare and train students and teachers according to the new society demands.

2. VET-Education of ICT and Robotics in SPAIN

2.1 Political and educational framework

Education in Spain is under Education Ministry regulations but there are seventeen regional governments in charge to manage and fund the educational centers in their territory. Both types of administrations are guided by quality, equity, cooperation, teaching freedom, no discrimination, equal opportunities, efficiency and transparency in the use of public resources.

Education is mandatory and costless from 6 to 16 years old, but families have to pay books and other materials required in class. Last period of school that goes from 16 to 18 is free of charge too but not obligatory. Education at university is not free but the state subsidizes part of the fees.

There are public, concerted and private schools. Most of the concerted and private centers are usually related to the Catholic Church and they are not costless.

LEVELS:

- **PRESCHOOL EDUCATION**

  It is divided in two cycles and it is not mandatory. First one goes from 0 to 3 years old. It is not free but there are different help programs for the disadvantaged families. Second one goes from 3 to 6. It is free in the public schools and in spite of being not obliged it is followed by nearly 100% of the children. This level objective is to promote the physical, social, affective and intellectual development.

- **PRIMARY EDUCATION**

  It consists of six academic years from 6 to 12 years old. The main goal is to develop their social and creative skills and get a common basic education in culture, reading, writing, mathematics and speaking.

- **SECONDARY EDUCATION**

  There are two very different cycles:

- Obligatory Secondary Education (E.S.O.). The last period of the mandatory education that consists of four academic years, comprising from 12 to 16 years old. During the last year students can choose between two modalities, according to their future interests, VET or bachelorship.
- Bachelorship is a not mandatory stage that goes from 16 to 18 years old and the objective is to prepare the students for going into University or Higher VET. It is imparted in secondary schools too. There are three different modalities (sciences, art and humanities and social sciences) that are chosen according the future studies at the University.

HIGHER EDUCATION

There are different modalities including higher artistic teachings, higher vocational education, higher professional teaching of plastic arts and design and higher sportive teaching and of course, the most common, University education.

University education is divided in:

- Degree. A four years long program to study deeply a specific subject.
- Master. One year long program after a degree to specialize in a concrete subject.
- Doctorate. The maximum educational level given by the University. Consists of a research program of around three years long.

VOCATIONAL EDUCATION

VET studies in Spain are structured in three levels:

- Basic professional.
- Medium professional.
- Upper professional.

Basic professional is studied by students that are not completed the mandatory education. It is a way to reintroduce little motivated students in the official educational system to get an official qualification. Little by little this type of studies is getting more recongnition among the society and specially among youngsters.

Medium professional studies are practical studies followed by students after secondary education or basic level degree to get the specific skills to be hired. This type of studies is highly demmanded.

Upper professional studies are pratical studies followed by students that has completed the Bachelorship or after a Medium level degree. They are taught in secondary schools by secondary teachers. Some times they do not have an equivalence in other European countries.

In Vocational Education the Robotic approach is different. In this area there is a specific upper professional study called “Automatization and Industrial Robotic” specialized in Robotics. It is not widely offered in many communities and towns but it is one of the few opportunities to train Robotics in VET education. Additionally there are other electronic and electricity studies where Robotics is an important subject in different areas. Anyway, there are only a few hundred of students involved in such specialization.

On the other hand there are multiple studies related to IT, including basic, medium and upper professional VET studies.

Education in Spain has evolved a lot in the last 50 years. Literacy rate is nearly 100% but during the last decade we have had to face the incorporation of immigrant students. Recently, as a consequence of the severe economic crisis the rate of immigrants has steadily decreased.

Nevertheless, some of the most important problems in our educational system are:

- Many educational laws. From 1970 there have been 12 major educational laws but with not many important improvements. Even more there are seventeen different educational regulations corresponding to every one autonomous community.
- High school dropout rate. Students that get the secondary education qualification are nearly half that the European average (24% against 43%).
- Low vocational student rate. In spite of the huge efforts of the administrations vocational studies are not very much appreciated but the rate is slowly rising.
- High university student rate. In Spain University studies are very well reputed. That is why there are so many students in spite of the difficulty of getting a working position according to their qualifications. European average is 34,7% against 29,3% in Spain.

2.2 Integration of Computer Sciences in autonomous education curricula

The Spanish education system establishes guidelines for the autonomous organisms that must be followed. Computer Sciences teaching is being introduced in Spain at different rates and with different approaches according to the Autonomous Communities.

According to the information gathered at the beginning of 2015 both from public bodies and from the plans for the incorporation of Computer Sciences in education announced by some Autonomous Regions are still few cases with a clear integration in the curriculum.

In Primary Education, the case of Navarra stands out, which has included elements of the these sciences in the curriculum of the subject of mathematics, and through the program Código21 it provides training for teachers and offers resources for learning and teaching this subject. (http://codigo21.educacion.navarra.es/)

In Secondary Education, both in the Community of Madrid and in Catalonia have specific programs to integrate the Computer Sciences, including specific actions for teacher training. In Madrid a specific subject has been set up in Secondary Education, Technology, Programming and Robotics, which includes computer programming. Through the Code platform Madrid provides training to teachers.

In Catalonia the initiative mSchools (http://mschools.mobileworldcapital.com/es/que-es-mschools/) has introduced the programming of mobile applications in Secondary

Education, in a project promoted in public-private collaboration between the Regional Government, the Barcelona City Council and the Mobile World Capital Foundation.

Other Autonomous Communities are beginning to train part of the teaching staff and offer online resources, such as the Code Octopus platform (http://www.edu.xunta.gal/eduga/825/contidos-educativos/codigo-octopus-programar-con-scratch-educacion-primaria-secundaria) in Galicia, or promoting initiatives such as Creative Technologies in the Classroom (CTC) of the Arduino Foundation, which has already been implemented in centers of Castilla-La Mancha, Andalusia, Madrid and Catalonia.

In general, the different autonomous communities in Spain are adapting their teachings to the incorporation of subjects such as Robotics and STEM competitions. One of the pioneering communities in this sense has been the Community of Madrid. Here we can see an example of the curriculum taught in this community in the subject of Technology, Programming and Robotics.

The material is structured around five axes:

- Programming and computational thinking.
- Robotics and the connection with the real world.
- Technology and the development of project-based learning.
- Internet and its safe and responsible use.
- Design techniques and 3D printing.

2.3 Situation of Robotics and STEM in our community

Although Robotics is not included as a specific subject in any of the educational levels in Castilla y León, it does provide training in this area, both to students and teachers, through different initiatives:

2.3.1. CyL Digital Educational Robotics

The Junta de Castilla y León, through the General Directorate of Telecommunications and in collaboration with the Ministry of Education, launches this pioneering initiative that takes place in the Community's Digital CyL Spaces.

The project "Educational robotics CyL Digital" aims to initiate children and young people in the development of abilities and basic skills through the resolution of small learning challenges through the use of Robotics and programming, developing the taste and interest in Science and technology.

Educational Robotics, in recent years has been configured as an effective resource for interdisciplinary work and improvement in teaching-learning processes. It encourages the imagination, awakens concerns and helps children to better understand how the world around them works.

Moreover, there will be a training course on educational Robotics aimed at trainers, educators and technology teachers so that later they can teach activities with their own students in the classroom or in the CyL Digital Spaces of Castilla y León. All the people who have been trained through the

Project, will have at their disposal two kits of educational robotics, Lego We Do and Arduino bq, for their free use, either to practice and train at their own pace, or to teach activities with children in their own CyL Digital Spaces.

2.4 Policy-review in education regarding ICT/Robotics

"Education in Computer Sciences in Spain 2015" is a report, prepared by Google, the Spanish Foundation for Science and Technology (Fecyt) and Everis, aims to analyze the situation of teaching in Computer Sciences in Spain for students between 6 and 16 years, proposes a series of recommendations for the introduction, expansion and improvement of the teaching of this subject in the short and medium term.

Given the growing presence of technology in society and the increase in the demand for digital professionals by the labor market, this report identifies the decisive factors that impact the decision of students to opt out or discard the study of Computer Sciences, and proposes a series of areas of action and recommendations to strengthen these subjects in the school and family environment.

The report is based on a study based on more than 2,000 surveys of parents and students, interviews and focus groups with directors, teachers and families from eight autonomous communities, as well as a panel of experts, which allowed researchers to investigate the causes of the lack of vocations for the study of these sciences, identify the barriers and the keys to increase the positive perception and the interest for the teaching in this matter.

The report shows that there is widespread ignorance in Spanish society about what these sciences are, being one of the critical barriers to understanding their importance and the value of their learning from an early age. Thus, 82% of parents and 76% of students between 12 and 16 years of age confuse them with other terms.

As the report shows, the presence, still scarce, of these subjects in the school curriculum is one of the causes of this ignorance since their study in Primary and Secondary Education is in its initial phase, as it has not been adopted by most of the schools in our country. As a consequence, both the use of digital devices (5% in the case of Primary students and 16% in Secondary students) and the recognition of programming languages (only 24% knew Scratch as a tool for programming) is still testimonial in our educational centers.

2.5 Teachers training in Spain

Concerning to teachers and according to the results of the "European survey to schools on ICT in education" (2013), Spain occupies the first position in ICT training in recent years as regards the highest number of hours per teacher of this type of training; however, in the surveys, teachers consider themselves their training low and poor for the full integration of technological means. This paradox suggests the need to rethink the effectiveness of ICT training which is a bit oriented generally to digital immersion teachers and educational use of new media.

In Spain, the percentage of teachers reporting use of ICT "often" or "all or almost all classes" is slightly lower than the OECD average (37%) and is also lower than the percentage of those who said they need training in new technologies (14%).

2.6 Future perspectives

Regarding the future of teaching programming and robotics in Spain, currently, Programming and Robotics are disciplines in full effervescence within our country, following

the line marked by other pioneering countries in an effort to implement more stimulating teaching methods for their students.

Connectivity and equipment will be arriving to all the classrooms, but it will be more difficult that there is a sufficient level of digital teaching competence if there isn't a common frame of reference that allows its widespread accreditation (not as something optional or reserved for those who have interest in applications and computing devices).

From our point of view, for the efficient development of the project it is strictly necessary to know the current situation of trainers and teachers' regarding their ICT skills for teaching and the use of new technologies in the workplace. This clearly justifies the need for developing a national report on the status of trainers and teachers in this regard.

A coherent plan of training should be developed in order to allow teachers to obtain their ICT qualification, provide them with tools and develop a proposal for measurable indicators to reinforce one of the worst served areas of teaching professionalization in the initial training.

2.7 Needs of the Labour Market in the Sector of ICT/Robotics

Nowadays in Spain, the industry has about 29.000 robots, and this figure is increasing every year. Our country occupies the fourth place in Europe in Robotic sector. Likewise, the demand for the jobs in this sector is also on the rise. The Sabadell Robotik in 2010, the second intersectoral Robotics and Automatic fair, is an event that shows the good trajectory of the sector in our country.

Companies are investing in this branch of engineering. In fact, mobile technology is requiring robotic applications. Small and medium-sized enterprises are already offering jobs in artificial programming and Robotics. According to data from the Spanish Robotics Association (AER), the automobile industry occupies about 19,000 robots.

Many enterprisers have opened a path to work in these technologies: they require drones for their activity (city vigilance business, image capture or facility maintenance). It is expected to be a growing market, so it means more applications.

But Spain is not only a robot consumer but it is also a country where there are many people interested in this technology.

The Robotics aimed at consumption and leisure, is the one that has more growth even above the industrial one. There are studies that emphasizes that the demand for robots of consumption could reach the six million units sold in 2019, with a value of more than 1.1 billion euros. These provisions do not include toys, so the figure could reach 2 billion euros.

Interview and newspaper articles point out that in 2020 Spain will need 100,000 professionals in information technologies. In Europe between 720,000 and 1.3 million. These data come from a study of the General Council of Professional Colleges of Computer Engineering (ICCI).

It will be necessary in the labor market the training of workers in this field, and a greater specialization in Robotic sectors.

- Sectoral needs

Randstad Professionals, business specialized in search and selection of technical and responsibility profiles, has carried out an analysis to know the needs of the companies point out that 2019 and further years, the technologies more demanded will be:

Rank	Professionals
1	IT Profiles: Developers, analysts, computer scientists.
2	Engineers: Robotics and industry.
3	Fintech: Risk analysts, data processing.
4	Sales: Brand Manager, Key Account manager and marketing manager.
5	Medicine: Medical advisors and medical manager.
6	Retail: Retail manager, store manager or Visual merchandiser.

Robotics, Mechatronics, Biotechnology, Big Data and mobile application development are the specialties with the greatest demand for professionals. The field of Robotics is quickly changing to meet the demands of our labor market. So, it is necessary train students, that is the reason for which Spanish institutions of education introduces new knowledges as Scratch, Arduino, Raspberry PI, Lego… in ESO (Education Secondary Obligatory) and further studies.

The needs and demands of our enterprises are also languages that are essential, regardless of specialization; and I would remark any project in Robotics has to get funding with private or public money. It is necessary to make investments.

2.6 Technological companies collaborating in Robotic programs

In Spain, there are basically two companies that are collaborating with the education of students in the Robotics field. They are:

- Microsoft company through the “Hacking stem program” and
- Samsung through the “Samsung Smart School” program.

Microsoft’s Hacking STEM program

This easily downloadable program is initiative aimed at helping teachers modernize their curriculum for the 21st-century with a suite of free, downloadable tools, including lesson plans, related activities and customized Excel spreadsheets. Written by teachers, for teachers, the materials complement the existing STEM curriculum by integrating all four disciplines into a set of classes that is easy to implement. The program enables teachers to guide students through the construction of homemade anemometers, windmills, robotic hands and more. It accomplishes all of this with affordable, everyday materials like paper plates, plastic cups and spoons, drinking straws, small LED lights and simple circuit boards.

It is an opportunity to change the way that students learn by creating crafting lesson plans that are experiential, engaging and fun. Teachers spend less time mitigating behavioral issues and more time guiding their students on how to think their way through problems critically. They empower them to find answers on their own.

Students are becoming creators, in disciplines that didn’t always seem creative. They are comfortable in blending the digital and physical worlds and they understand the

importance of envisioning a future for themselves. Empowering these students to succeed should be our most important challenge and opportunity.

The lessons made by Microsoft are practical, they bring real-world scenarios into the classroom, the needed materials are quite affordable and accessible, and finally, but not less important, they are democratizing the STEM learning.

Samsung's Smart School program

The aim of this program is to engage students and enhance classroom management with advanced digital technology solutions, creating an interactive and collaborative learning environment. Nowadays teachers are finding it increasingly difficult to provide personalized attention to students. This challenge is becoming a serious concern among educators. As a result, teachers are looking for dynamic new ways to engage students in the learning experience. Educators need to focus on tools that not only motivate students to learn, but also increase collaboration and enthusiasm. That is why this program is trying to create new interactive lesson in the field of Robotics. At the moment, there are no great advances and results, but day after day new improvements and tools are being developed.

2.7 Exhibitions

Global Robot Expo (IFEMA - Madrid, April 2018)

It is the most important Robotic trade show in Europe with all sectors represented. Global Robot Expo is the definitive trade show to measure the current state of Robotics in every single field. From educational Robotics, to industrial, consumer, professional service Robotics, healthcare, AI, software, IoT, smart cities, related technologies or drones.

The third edition of Global Robot Expo, the international exhibition on Robotics, related technologies and innovation will take place for first time at IFEMA, Madrid in April 2018. GR-EX will feature the latest advancements in Industry 4.0, Service Robotics, Artificial Intelligence, Smart Technologies, Drones & Aerospace, Educational Technologies, Healthcare Technologies and 3D Printing. Together with conferences, demos and technical talks from top international speakers from all over the world.

In an expanding industry with an annual growth of 17%, being the reference in Europe in consumer Robotics, professional Robotics, medical Robotics, etc., means being the technology trade show with most future in the European market. It also ensures a high volume of media impacts.

2.8 Robotic competitions

Perhaps the first university competition was Alcabot, (http://asimov.depeca.uah.es/robotica/), in the University of Alcalá de Henares (Madrid) in 2000. It was promoted by some teachers and has been supported by student organizations and clubs. Following the lead of Alcabot, Robotic competitions began to proliferate in other universities across Spain during the following years like Robolid, (http://robolid.net/), born in 2003 in the University of Valladolid. The typical organization consisted of:

- Speedsters competitions, where the robots are line-followers and chasing one another
- Followers competitions, where the robots are line followers too, but they have to solve a circuit where the line they follow have bifurcations preceded by marks that order the robot to follow one of the two possible branches.
- Mini-sumo competitions, where two robots fight to throw the opponent out of a dojo.
- Maze competitions, where robots try to solve a maze in the shortest time lapse.

Soon VET schools followed the path open by the universities. Probably the very first VET Robotic competitions were MadridBot and Robolot. Madridbot began in 2005 as a competition for High Degree Vocational Studies in Electronics in the Autonomous Community of Madrid. After the first editions it became global gathering students from schools all around Spain and becoming a reference VET competition. It lasted until 2013 and disappeared because of the lack of support from political authorities.

Meanwhile Robolot, (https://sites.google.com/site/robolot/home), began in 2002 as a local competition in Olot (Girona) but it was growing becoming a reference competition in Catalonia first and then in Spain until now. This year they will celebrate the 16th edition of the competition. The focus of this competition was different from other robotics competitions. It was directed towards electronics VET students, but also (and primarily) towards secondary and primary students, as a way to promote the use of robotics, programming, electronics, etc. This perspective is what has become popular in robotics competitions nowadays in Spain.

Following MadridBot experience, in Andalucía appeared two new Robotic competitions: MalakaBot (Málaga), (http://malakabot.com/), in 2009 and GranaBot (Granada), (http://www.granabot.es/ConcursoGranaBot/indexR.php), in 2012. Nowadays they take place in alternating years: in 2017 was the 6th edition of Malakabot and in 2018 will take place the 4th edition of Granabot. Both of them have evolved from just a VET Robotic competition to a wider spectrum competition including conferences, workshops (Arduino, 3D printing, etc.) competitions and presentations, not only directed towards VET students but to secondary and even primary students. Similar to these competitions is DBSariak (Errentería, Vasque Country), (http://www.donbosco.hezkuntza.net/web/guest/dbsariak), which began in 2010 and will celebrate this year the 9th edition. The schools promoting these competitions had been involved with other VET schools in different projects during the last 10 years and as a result they have built a network of schools all over Spain that has contributed also to the development of those competitions.

Meanwhile, mostly apart from VET students, and mostly directed towards secondary students have proliferated a lot of Robotic events. Generally speaking they are not pure

Robotic competitions but they have evolved to a mixture of competition, workshop, presentations, etc. of Robotics, electronics 3D printing, DIY and, STEAM in general. Nowadays there are a lot of them, but we should highlight “The First LEGO League”, (http://www.firstlegoleague.es/), “VEX Robotics competition”, (http://vexcompetition.es/), “Robocup Junior”, (http://www.robocupjuniorspain.es/), “Eurobot”, (http://asimov.depeca.uah.es/robotica/course/view.php?id=27), “Hebocon”, (https://fseneca.es/hebocon/2017/12/15/la-hebocon-mas-grande-del-mundo/), “STEAMBot Challenge”, (http://steam.bot/challenge/), “Desafío Robot”, (http://www.cac.es/es/web/desafiorobot/), “Cosmobot”, (http://lnrc.es/cosmobot17/), and “Fantec”, (https://aptandalucia.wordpress.com/2017/05/24/termina-la-iii-edicion-de-fantec-galerias-de-fotos/

3. Empirical Research

3.1 Sampling and Method

- Description of the questionnaries

According to the other partners we prepared two questionnaries to distribute between two different groups: students and teachers. Once we agreed the format, number of questions and answers and vocabulary for each group we took in account the difficulty to get the results. So, our team concluded that it would be better to prepare a digital google form report to share among both collectives.

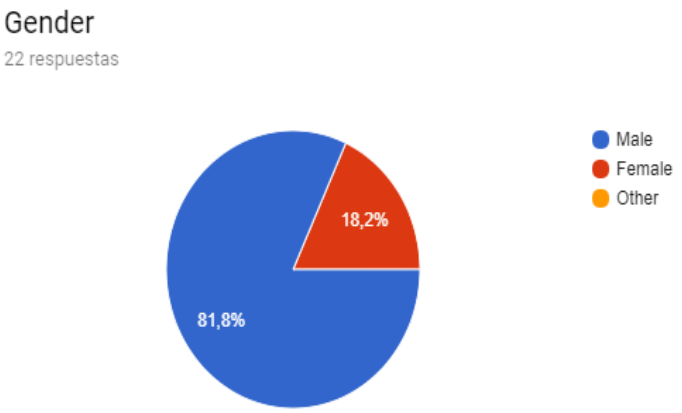
During the kick-off meeting we agreed to share these questionnaries with the other European partners.

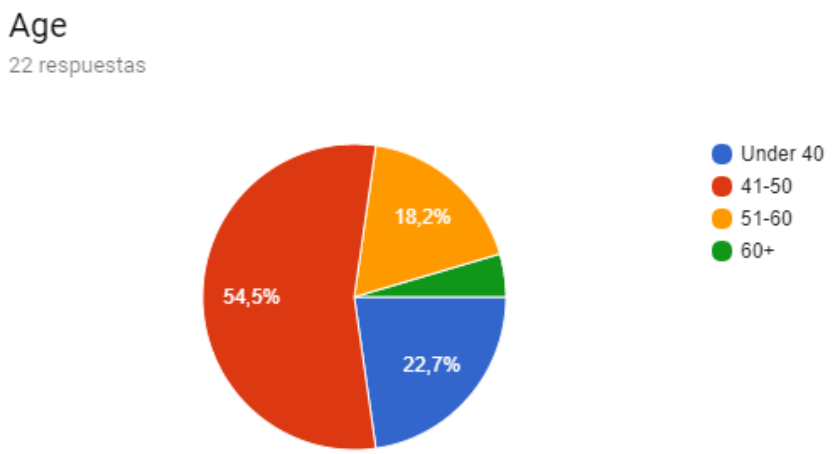
- Participants

There were two groups clearly differentiated: students and teachers. We have tried to find a hetereogeneous people representative of the Spanish population and we have registered more answers that we were asked.

3.2 Results

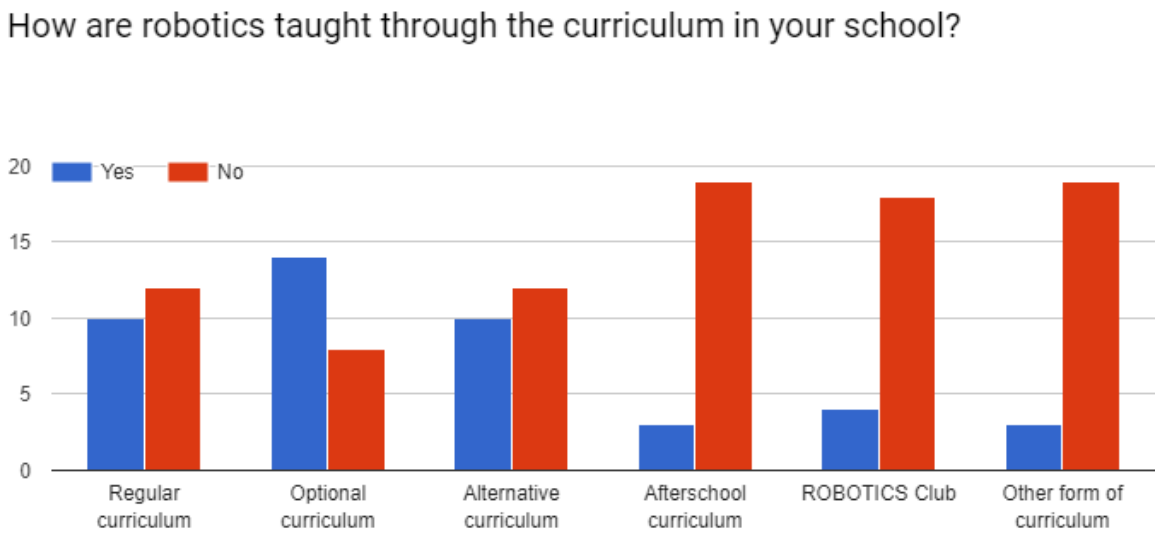
TEACHERS: There were 22 answers, 20 from men, 2, from women, according with the women participation in this sector. The age of the participants was mainly from 40-50 years old.





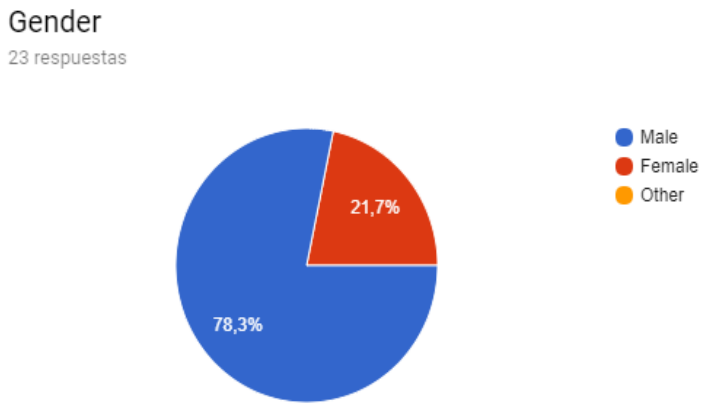
They mainly work in VET and public secondary schools. In general they consider that the schools have appropriate materials and rooms for teaching.

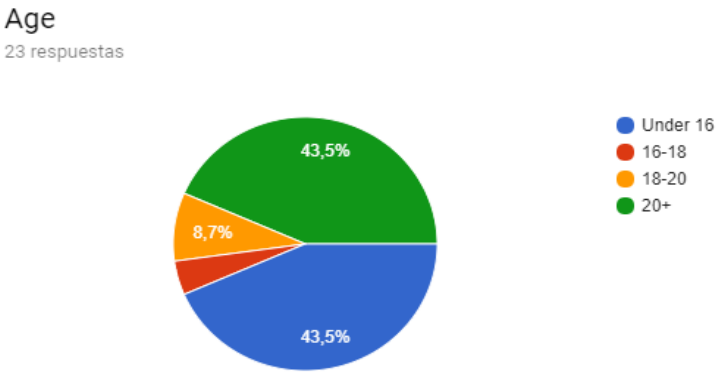
One of the most significant aspect of the report is that the Robotics subject is taught through unofficial programs, after school programs, clubs,...:



They demmand more trainining in particular in subjects as Robots building.

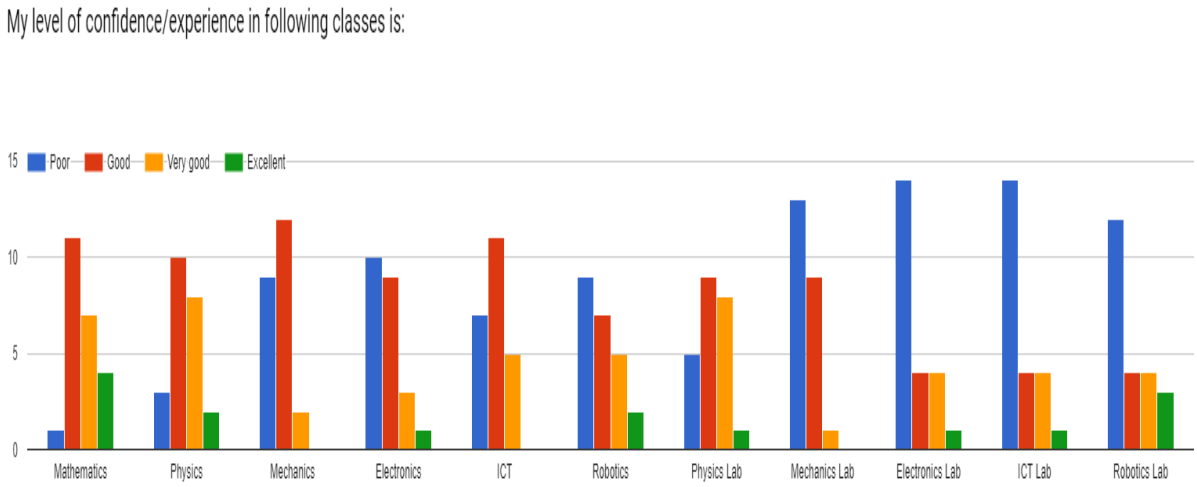
STUDENTS: We received 23 answers with this gender and age distribution:





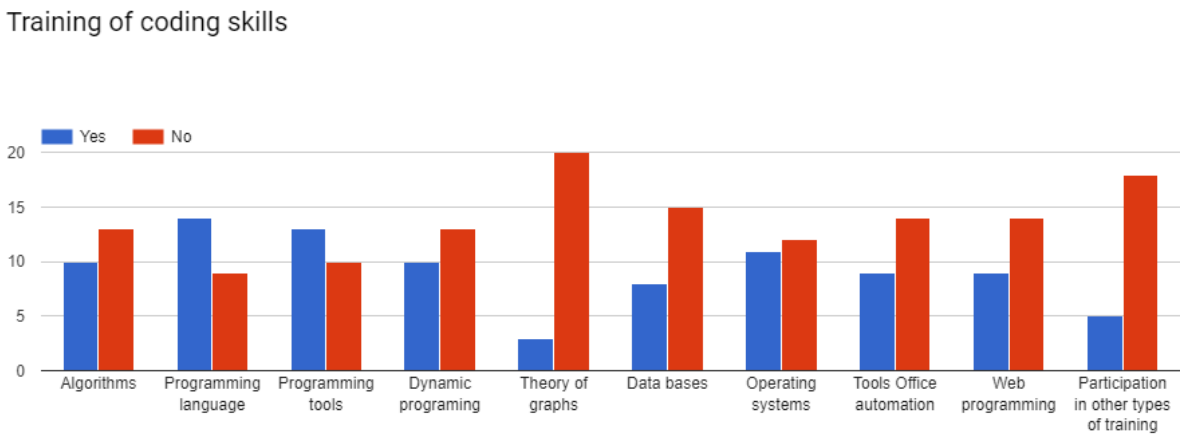
As we can see there were more participation of men and they were equally distributed between VET students, above 20 years old, and Secondary students, under 16. There were a few answers coming from other different groups of age.

Their level of experience is in general good in Maths, Physics and ICT but poor in different labs, Electronics and Robotics.

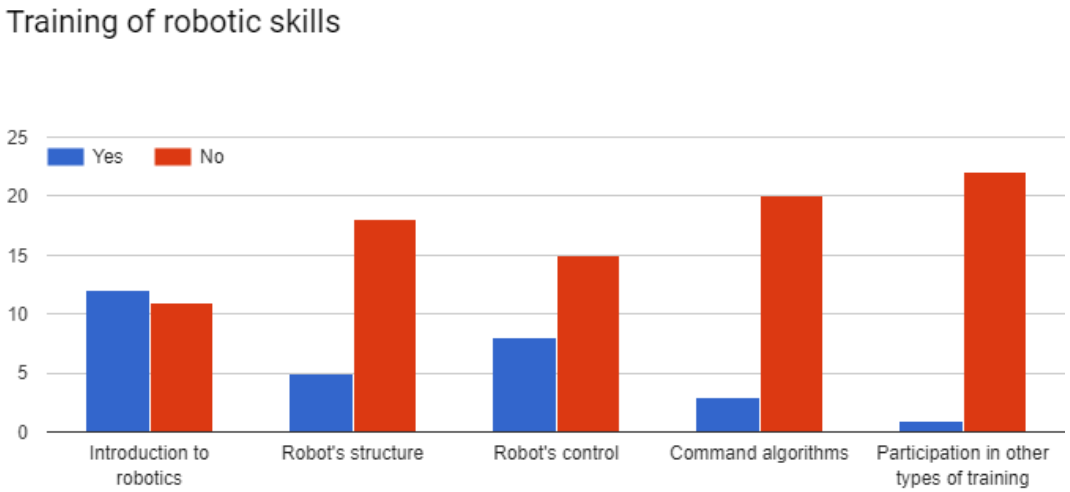


There is an important group of students very interested in Robotics but there are some ones interested in programming, games and web development too.

They consider that exist good oportunities to train in programming but hardly nothing in Theory of graphs, Dynamic programming, algorithms, Databases or other types of different training.



Generally, they are very interested in Robotics and in particular in some aspects, as:



4. Conclusion

- The use of technologies in general is low, specially between women. The gender gap apparently is increasing.
- There is a huge interest in training is some aspects of Robotics, specially Robot building and other IT fields (programming, games,…)
- The teachers have a low level of ICT skills, especially in skills-oriented to education.
- The respondent level of training in technology resources exceeds the demands regarding the educational use of them.

- Digital skills training is mostly voluntary for teachers and students.
- Voluntary teachers have access to a large number of training resources, mostly through online platforms.
- Teachers who have completed a course related to new technologies indicate that the training has contributed positively to their teaching practice.

Summing up the theoretical and empirical research, it's obvious that the information and communications technologies ***(ICT) have become an essential tool*** in the world around us. Schools have also seen in recent years how ***ICT are gradually incorporated in the daily activities,*** although it is true that the incorporation varies considerably from one center to another. Differences in the use of ICT could be partly due to the lack of teacher training in this regard.

One of the five priority lines of work in the field of ICT that this plan sets out is: teaching digital competence (***establishing a development model of digital skills of teachers*** in its various dimensions and levels).