

Intellectual Output 1

A1: Rationalization Phase –
Qualitative & Quantitative verification

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Valencia Inno Hub

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REFERENCED DOCUMENTS

ID	Reference	Title
1	2020-1-UK01-KA201-078934	IPinSTEAM Proposal
2		

APPLICABLE DOCUMENTS

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1		
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1. Introduction

1.1 The scope of the project

On the point of creativity and innovation being the roots of European cultural and socio-economic growth, respecting others' work becomes a far-reaching need both for professional and personal development of individuals (EUIPO, 2017). On the other hand, nowadays that online sharing of information is rife, one cannot help but wonder whether people are aware of proper ways to attribute others' ideas along with the necessity to reap the benefits of intellectual potential given the fact that most innovations are now highly related to technology.

Au contraire, the absence of Intellectual Property (IP) protection of educational materials and innovations – with online learning only deteriorating the situation – reveals a significant problem in many European countries. In fact, while uncontrolled access is given to educational resources across the Web, the majority of learners are not aware if IP is implemented in their work as well as ways to protect their own intellectual property (Evans, 2016).

On the grounds that STEAM comprises continuous innovation, invention, discovery and understanding of technical knowledge that lead to (commercial) products, the protection of inventions becomes more and more complex (National Inventor Hall of Fame, 2019). Conceivably, this reveals the rationale behind the lack of IP in school education. In particular, recent research has depicted the knowledge and implementation gaps related to IP, resulting in lack of knowledge about working definitions of IP in the field of Arts. In conjunction with the fact that most European countries are not in position to capture the relevance of IP in STEM, the need to integrate IP in STEAM curricula becomes even more significant (Office for Harmonization in the Internal Market, 2015).

1.2 The project objectives

In order to address the lack of IP knowledge resulting in inefficient implementation of IP in the world of inventions, the IPinSTEAM project aims at promoting IP strategies in schools and more specifically in STEAM education under the prism of confronting this issue from its roots. To achieve generating awareness about Intellectual Property across European educational institutions, the project will develop an innovative ICT-enabled training package focused on the needs of K-12 STEAM teachers.

Towards that purpose, the project will develop and validate training materials tailored to the real needs of school teachers, educational institutions and STEM departments towards giving shape to the integration of IP concepts into STEAM curricula.

1.3 The project target group

The **direct target group** of the project involves STEAM teachers, mainly primary school and lower secondary school teachers (ages up to 12). They will learn the key concepts of Intellectual Property along with useful information and guidelines about ways to efficiently implement IP strategies in STEAM-related subjects and integrate them into their curricula. By all means, all school STEAM departments can be regarded as direct target group of the project.

The **indirect target audience** of the project comprises:

- Students up to 12 years old
- Schools and educational institutions teaching STEAM-related subjects
- Law schools and departments

- Policy makers responsible for the design and implementation of actions relevant to ICT strategies for educational purposes
- Other institutions or organizations that are active in school education
- Authorities or organizations that can organize specific actions in order to contribute in the development of high-quality education
- Networks, voluntary associations and other NGOs that are active in school education
- Research communities active in the broader field of lifelong learning
- E-learning enthusiasts

2. National state of play

2.1 The scope of the report

The objective of the present report is to diagnose and analyze the current situation of the project target group with regards to the implementation of Intellectual Property aspects in STEAM teaching. Documentation on the main findings will result in the identification of the actual needs of K-12 teachers based on their level of IP knowledge and the skills required to properly integrate relevant concepts into their curricula. Consequently, the goal is ultimately the formulation of a complete training package covering their needs in terms of bridging the gap between the current state of play and the desired situation.

2.2 Main findings

1. Which are the most commonly taught STEAM subjects in your country's school curricula?

In Spain, studying is compulsory until the age of 16. The courses offered by the educational system are: Early Childhood Education, Primary Education, Compulsory Secondary Education (ESO), Baccalaureate, Vocational Training (VET), Adult training and university education. In addition, Language Teaching, Artistic Teaching and Sports Teaching, considered Special Regime Teaching, are also offered.

Primary Education: it is the first compulsory stage of the educational system. It comprises six academic courses taken between the ages of 6 and 12.

Secondary Education (ESO): It is the second and last compulsory stage and is taken from 12 to 16 years old. Covers four academic years.

High school: It lasts for two academic years, which are taken between 16 and 18 years of age

This title allows access to the different higher education teachings.

Specially in Secondary Education, we find that the most commonly taught subjects are the ones related with science and technology, but we have also found schools that regard arts.

In terms of science, we find special relevance in Mathematics. In this framework, **mathematical connections** acquire a special role, since in addition to promoting the interconnection between contents, they encourage joint work with other areas of knowledge such as science, technology, engineering, the arts, humanities and social sciences. In general, in addition to establishing close links with the environment to

respond to the needs and challenges of education in the XXI century. The connections between mathematics and the other areas of Knowledge show that, despite the fact that currently the most common educational practice is still the isolated work of mathematical content, interdisciplinary activities are occupying an increasingly important place in the classrooms of all educational stages. So, mathematics can. work in connection with science, technology, engineering, art, etc., giving rise to STEAM education.

We also find special emphasis in **Robotics**, which is implemented mostly in secondary education through diverse means such as laboratories, contests, and nationwide competitions, but we can find its development also in primary education, for example “Educative Robotics”¹:

“Robots can be a key tool to access curricular content according to STEAM education. In Future Kids, in addition to technologically training our students, we educate them in values and social skills that will allow them to enhance teamwork.”

In this concrete discipline students develop subjects such as **Natural Sciences, Social Sciences, Mathematics, Technology and English** through robotics and programming.

Forensic Science² International educational project in Bacalaureate and endorsed by institutions such as Innobasque, the Ertzaintza or the University of the Basque Country, among others, in which more than 13 schools and institutes in the Basque Country participate. The aim of the project is to promote the STEAM (Science, Technology, Engineering, Arts & Mathematics) skills of students through Forensic Science. Students take part in the investigation of a simulated crime scene, from which they must carry out the corresponding analyzes and studies. The final works will be presented before a panel of experts and professors of the UPV.

Greenpower is a project that is currently being developed in many schools in the UK but also in Spain. The young students work as a team and develop STEAM skills, through the construction of electric and ecological cars with which they will later compete. In this way, positive perception of science, technology, innovation and the environment is promoted in students.

It also favors connections between the educational field and the business world. Students must seek the necessary sponsorships and resources to achieve their project materialization, with which they also work communication and sales skills, in addition to preparing a business plan, which they have to prepare and explain to the sponsors.

IP related objectives in the curriculum:

Primary: value, respect, care of common heritage, goods and public services; information and digital skills, critical use of information, respect agreed norms; creative participation in linguistic games; use of audio-visual media and ICT; creativity, value artistic manifestation; respects norms regulating IP in music (musical education).

¹ <https://futurekids.es/metodo-fk/>

² <https://www.gaztelueta.com/es/innovacion-steam/competencias-steam>

Lower secondary: property, software, licenses, critical and responsible attitude towards propriety (technologies); respect creations of others (plastic and visual education); democratic values and norms, rights, liberties; responsibilities and civic duties (social and citizenship skills); positive attitudes towards technology and communications innovations (IT education and technologies).

Upper secondary: critical use of bibliographic references (literature), critical knowledge of ICTs, social attitudes and values (creativity, curiosity, critical reflection), information transfer, privacy control and data protection (sciences of the contemporary world); moral action: liberty and responsibility (philosophy); freedom of expression and individual rights (audiovisual culture); artistic heritage of music and dance (history of music and dance).

Examples of good practices of IP education:

“Educate to create: Intellectual Property in the classroom”: project carried out by the University of Alcalá, in conjunction with the Education area of the Principado de Asturias in 2008, with the participation of students in elementary, middle and high school (6-17 years). ([http:// www.ite.educacion.es/formacion/enred/materiales_en_pruebas/educar_para_crear/](http://www.ite.educacion.es/formacion/enred/materiales_en_pruebas/educar_para_crear/))

“Learning from the past to create the future: artistic creations and copyright”: The resource library of the Ministry of Education, Culture and Sport (MECD) offers secondary school teachers material to be used as a complement to literature and art programmes, particularly when students are asked to create original works in these areas. This material was created by the World Intellectual Property Organization and translated into Spanish by the Ministry as a concrete action within the government’s integrated plan for reducing and eliminating activities that infringe intellectual property.

2. What teaching skills do STEAM teachers regard as the most important?

1. Reflective, organized, active.
2. Questioning, that invite us to explore and discover.
3. Critic
4. Resolute, to solve conflicts or minimize impacts.
5. Expressive
6. Interpret the environment, provide strategies
7. Promote logical and critical thinking.
8. Clear and concise in the expectations that schoolchildren are expected to achieve.
9. Satisfy the requirements of STEM proficiency.
10. Integrate assessment as part of instructional design.
11. Plan teaching action so that it has a long-term effect.

3. What is the level of awareness of Intellectual Property concepts in your country? How IP is implemented (sections, purposes and target groups)?e

Intellectual Property is not implemented as its own subject in K12 education. It is only taught in Law³ or Economic-related aulas at the University.

Moreover, for this same reason, Spanish common citizens, meaning with that the ones that don't study Law or Business, only possess general knowledge about it.

Regarding primary and secondary education, as I said, they don't study IP as itself, but in some schools curricula we can find references of it in a subject named "Ciudadanía" in English "Citizenship" (the name can differ depending on the Autonomous Community or even the changes of the Educational System, but we can find it almost in every school on the country). In this mentioned subject respect for intellectual property is worked through the promotion of the critical use of bibliographic references (in Literature); critical knowledge of ICT; social attitudes and values (creativity, curiosity, critical reflection); the transfer of information, privacy control and data protection (in Contemporary World Sciences); moral action: freedom and responsibility (in Philosophy) and freedom of expression and individual rights.

"IP is not specified in the national arts curricula of various countries, including Bulgaria, Greece, Portugal, Hungary, Latvia, the Netherlands, Slovakia and Spain"⁴

Ongoing reforms or debates:

The whole basic curricula in Spain will be significantly modified by a new legislation: the so-called Ley Orgánica para la Mejora de la Calidad Educativa (Organic Law for the Improvement of the Educational Quality) or LOMCE 1. This law will be applicable from the academic year 2014-2015 and introduces important changes in terms of rationalizing and simplifying the educational offer. The LOMCE gives greater weight to the major subjects ("asignaturas troncales") in detriment of the more specific ones ("asignaturas específicas"), as a way to reinforce and guarantee the solidity of the basic competences. This law improves the skills related to innovation and entrepreneurship in the basic curriculum, by giving two options during the first level of secondary education: an option for preparation into higher Secondary Education and an option for preparation into vocational education. Within the curriculum of the general primary education, there is even an explicit mention to IP in the "Educación Musical" (Music Education) and in the "Educación Artística" (Artistic Education) subjects, where it is stated that the student "accepts and respects the norms regulating the intellectual property in terms of use and copy of music creations" and that he/she will not "allow the use of his/her own image when he/she does not consider it purposeful"

4. Is copyright implemented in STEAM? If yes, how and in which subjects?

NO. (evidence on TABLE 1)

5. Are trademarks implemented in STEAM? If yes, how and in which subjects?

NO. (evidence on TABLE 1)

6. Are patents implemented in STEAM? If yes, how and in which subjects?

NO. (evidence on TABLE 1)

³Academic guide of the subject:

<https://webges.uv.es/uvGuiaDocenteWeb/guia?APP=uvGuiaDocenteWeb&ACTION=MOSTRARGUIA.M&MODULO=42676&CURSOACAD=2017&IDIOMA=C>

⁴ IP and Education Report, 2015

**7. Is design implemented in STEAM? If yes, how and in which subjects?
NO. (evidence on TABLE 1)**

TABLE 1:

SPAIN (ES)		Primary school education (age 6-12)	Lower secondary education (age 12-16)	Upper secondary level (age 16-18)	
				General	Vocational
Inclusion of IP elements in the curriculum	Separate 'stand-alone' subject				
	Integrated into a specific subject or as a theme across different curriculum areas	■	■	■	
Aspects of IP mentioned in the curriculum	SUBJECT				
	TRADE MARKS				
	DESIGN				
	PATENT				
	COPYRIGHT				
Additional aspects of IP mentioned in the curriculum	CONFIDENTIALITY, SECRETS, PRIVACY			■	
	PLAGIARISM				
IP connected learning areas mentioned in the curriculum	ENTREPRENEURSHIP		■		
	CITIZENSHIP	■			
	ARTS				
	ICT	■	■	■	
	STEM				

3. Conclusions

IP is an integrated topic from primary to upper secondary general level. It is touched on in lower secondary in subjects relating to entrepreneurship and ICT, and in ICT at upper secondary level. In Spain there are plenty of entry points for IP education from primary up to secondary education. At primary level students learn the notions of value and respect and acquire digital skills, including how to use and cite information.

Furthermore, students are taught the use of audio-visual media and ICT; including for creative activities, where they learn to value artistic manifestations and to respect norms, for instance, related to IP in music. At lower secondary level, students learn about software licenses in ICT, respecting art works and visual education and about values, norms and rights in citizenship education. Students also learn about innovations in IT education and technologies. At upper secondary level students additionally discuss citation practice, creativity, curiosity and critical reflection, as well as information transfer, privacy control and data protection in sciences of the contemporary world. Furthermore, they enjoy philosophy, audio-visual culture and music and dance classes where aspects of IP are approached.

We can extract these conclusions:

1st) Intellectual property is not taught as a subject. The aspects related to it are integrated in a core way with other subjects at all educational levels.

2nd) Within intellectual property rights, educational programs put more focus on copyright, to the detriment of others such as patents and trademarks.

3rd) In the countries that have been included in the study and that do not belong to the European Union, intellectual property is taught in primary school and, usually, is part of the Citizenship subject. At the community level, for its part, it is addressed in later stages and within more specialized subjects in ICT.

4. References

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5. <https://www.cedro.org/blog/articulo/blog.cedro.org/2015/11/18/-como-se-trabaja-la-propiedad-intelectual-en-el-ambito-educativo-claves-del-caso-en-espana>
6. Gobierno de España, Ministerio de Cultura y deporte
7. CRECIM, Centre de Recerca (2020)
8. EUIPO, Oficina de Propiedad Intelectual de la Unión Europea (Web, Articles and Reports)