Intellectual Output 1

A1: Rationalization Phase – Qualitative & Quantitative verification

Deliverable: IO1.A1.1 Compatative report

19.02.2021

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Project Number: 2020-1-UK01-KA201-078934

Co-funded by the Erasmus+ Programme of the European Union

REVISION HISTORY

Version	Date	Author	Description	Action	Pages
1.0	20/01/2021	HESO	Creation	C	TBS

(*) Action: C = Creation, I = Insert, U = Update, R = Replace, D = Delete

REFERENCED DOCUMENTS

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

APPLICABLE DOCUMENTS

ID	Reference		Title
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. Overall state of play

2.1 The scope of the report

The objective of this report is to compare, review, and draw conclusions about the current situation of the project target group with regards the implementation of Intellectual Property aspects in STEAM teaching across partner countries. 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?**

As one might expect when reporting on the approaches of six different education systems across Europe, methods vary considerably. That being said, it is possible to draw some commonalities – for a start in all countries the age group referred to is primary school level, with the last year or two in some of the countries qualifying students as secondary level. In terms of the substantive subjects, mathematics was reported as being an early STEAM priority in most countries. Whether this referred to a straightforward focus on numeracy or a more interdisciplinary approach to mathematics more broadly, mathematics and numeracy seem to be universally considered an early educational priority.

While parsing the sciences into their discrete categories proved in some cases difficult, especially owing to the more generalist approach that is often taken at primary school level, again it is possible to draw common conclusions. Many partners noted that early educational forays into the sciences in their countries tend to centre around environmental sciences and biology, with a focus on nature and outdoor exploration as a common approach. Some noted that this is generally followed by discussions of forces and more physics-based subjects, with the status of chemistry in the curriculum left somewhat unclear from these reports. In any case, reports and evidence suggests that these sciences also occupy a significant place in the primary curriculum.

Some partners found some difficulty in measuring the prominence of the arts in relation to other STEAM subjects due to the more common grouping of STEM, which excludes art. That being said, it is notable that almost all partners reported that the arts – generally including fine art but also subjects such as music and theatre – are included in the curriculum for the age group most directly targeted by this project.

The approach to teaching technology seems to vary between countries, although most partners suggested that technology issues were mostly contained within IT teaching. Some partners reported

that this was taught from a very early age, even in the age range on which this project focuses, while others found evidence that IT and computing skills are not generally broached until later in the primary school experience. Either way, it is a subject that does seem to be engaged with somewhere within the target age range in most countries of the consortium, albeit perhaps somewhat less than other STEAM subjects that are considered more core, such as mathematics or science.

Finally, engineering does not seem to occupy a significant place in primary school curricula in partner countries. Some partners reported some early involvement of engineering in the curriculum at a very basic level or only towards the upper edge of this age group, but others suggested no significant presence of the subject at this age group, and even in some cases a hesitance on the part of teachers to delve too deeply into the subject because of a perceived lack of resources and expertise. As such, this seems likely to be the least prominent of the STEAM subjects at the age group in question, from the information reported by partners.

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

Two of the most central threads in partner responses to this question many of them seem to have in common. The first of these, perhaps obviously, is strong knowledge of the subject area in question. In some countries, it was reported that lack of confidence in a given subject had a clear detrimental effect on the teaching of that subject in primary schools. Even where this particular observation was not made, the importance of subject knowledge was noted in several different countries as being important. This is especially so in light of the constantly changing nature of several key STEAM subjects. Technology in particular can require teachers to be able to impart lessons based on technologies that are relatively recent, or whose vagaries may not be common knowledge.

The second of these threads, albeit related to the first, is open self-development. An openness and eagerness to gain new knowledge and to learn new pedagogical approaches around STEAM subjects also came up consistently in different country reports. Part of this, as mentioned previously, is the inherent necessity of keeping subject knowledge up to date and relevant, but it was also frequently noted that interaction and collaboration with other teachers was an important and effective practice.

More generally, the national reports noted communication skills, creativity, organisation, problem solving, and critical thinking as being of importance to STEAM teachers. One partner also mentioned more practical skills, given the particular relevance of a “hands-on” approach to teaching some STEAM subjects that is seen as being more effective.

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

Most partners noted here that their country is associated with various international organiations whose concern is intellectual property, such as the World Intellectual Property Organisation, some for several decades now. Some also outlined their country’s long history – often over 100 years – of intellectual property laws in some form or other. In some cases, notably Spain and Romania, the partner also highlighted the opposite, namely areas of intellectual property law and debate that remain unsettled or controversial.

Most partners also noted here the prevalence of intellectual property in education, with many observing that it is ordinarily only introduced in a meaningful way later in the curriculum, with no standalone class of its own, but more often discussed in the context of IT, citizenship, or business-

related subjects. Some pointed out that the main subjects covering intellectual propoerty at a university level are business and law, in concurrence with the largely economic and legalistic way in which intellectual property is often approached generally. As mentioned, however, this did not preclude these and other partners from also noting its more academic pertinence in the context of citizenship, IT, or literature-based classes as mentioned above.

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

While some partners noted copyright-related concepts that are sometimes introduced in various school subjects at this age group, that copyright is complied with in the classroom, and that teachers generally have a working knowledge of the subject, all partners reported that it is not taught specifically in the curriculum at this age group.

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

Similarly to the above response, while trademark-related issues may be discussed in the curriculum and various points in this age group, it is not a subject that is formally covered.

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

Similarly to the above response, while patent-related issues may be discussed in the curriculum and various points in this age group, it is not a subject that is formally covered.

7. **Is design implemented in STEAM? If yes, how and in which subjects?**

Similarly to the above response, while design-related issues may be discussed in the curriculum and various points in this age group, it is not a subject that is formally covered.

3. Conclusions

As mentioned at the beginning of the report, it is clear that although the IPinSTEAM consortium covers six very different systems of education and intellectual property from across Europe, there are common threads and clear conclusions. There are notable trends, for example, in the prevalence that STEAM subjects have in primary education across countries and also trends in the skills that those teaching these subjects find important in doing their jobs. In terms of awareness of intellectual property, too, there are commonalities, such as the history of intellectual property law and the ways in which it is introduced into education generally.

But most significantly, there is a very clear gap across all countries in the teaching of specific intellectual property concepts and issues in STEAM subjects, but also across all subjects generally. This does appear to reinforce the goals of this project to promote the inclusion of such concepts in the teaching of STEAM at this age group. There are a number of ways in which this might be done, which will be elaborated at a later stage in the project, but from the assembled reports compared and summarized here, it is already clear what some of these may be. Sections on the feelings of teachers about teaching STEAM subjects and how to make it better will be of particular interest, such as observations made about the efficacy of a hands-on approach, as well as the importance of strong subject knowledge and continuous self-improvement.