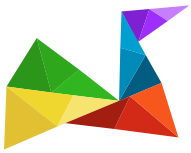
D.6.1
Socio Economic Evaluation

–November 2016–



DIYLAB

Do It Yourself in Education: Expanding Digital Competence To Foster Student Agency And Collaborative Learningy European Commissiony Educations Audiovisual and Culture Executive Agencyy -71400ALLPA4A3541A4AESAKA1MP

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D.6.1 Socio-economic evaluation of the DIY Lab[1]

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INTRODUCTION

This deliverable reports the socio-economic evaluation carried out to assess the impact of the introduction of a DIY Lab into schools and universities. DIYLabs were understood as flexible spaces for developing cross-curriculum projects, where participants introduce, develop and use inquiry-based projects based on their interests, connecting different subjects and topics, and using different kinds of educational resources, in particular digital technology (DT). In order to achieve this aim, through the whole Collaborative Action Research (CAR) process implemented (Reason and Bradbury, 2001), quantitative and qualitative data gathering methods have been developed to:

1. Evaluate the social impact of the DIYLab philosophies in primary, secondary and higher education in terms of:
    - The potential reduction of school disaffection and dropout rates;
    - The mitigation of teachers' fear and anxiety regarding digital technologies;
    - The impact on the digital divide.
2. Identify the economic impact in terms of:
    - Setting up and maintaining a DIY Lab;
    - The needed equipment and software;
    - The time investment needed by teachers and other educational actors.

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1 Part of this report has been published in: Sancho-Gil, J. M. & Rivera-Vargas, P. (2016). The Socio-Economic Evaluation of a European Project: The Diylab Case. Informatics, 3, 13, 1 -17. doi:10.3390/informatics3030013

The socio-economic impact review has been based on a range of conceptual and practical indicators of socio-economic significance in the educational area and will support the project by providing a transparent look at the costs of introducing a DIYLab into an educational context. These indicators include from reading to media literacy; digital educational divide; contribution to socio-economic development and employment; wider stakeholder participation and validation.

A fundamental requirement has been to take into account the wider socio-cultural context in which investments are made in order to realistically estimate their impact. The digital divide that runs along different age groups within a single society cannot be grasped in mere economic terms. In order to estimate and assess the cost of a DIYLab on digital competence in different educational and institutional contexts, it has been necessary to take into account the wider socio-cultural dimensions of such a Lab and to embed purely economic necessities into the wider existing cultural context.

This evaluation drawn on the data collected during the implementation phase (WP4) and co-assessment (WP5) of the project, in addition to conducting series of interviews with relevant stakeholders in each country (school administrators, teachers, students, parents, educational authorities). The data has been used to analyse:

- The pros and cons of the pedagogical approach underlying DIY Lab philosophies;
- The cost of the required infrastructure: wiring, connection rates, computers, peripherals, computer programs, etc.;
- The average cost of the infrastructure needed for families to be able to benefit from the educational use of DIY Labs;
- The amount of time invested by teachers in self-study activities and the cost of needed in-service professional development.

1. Background

Safeguarding against an overly reductionist concept of socio-economic evaluation by acknowledging the social, human, professional and institutional costs alongside the purely economic costs of educational change is a first step in unlocking the complex nature of such an undertaking. However, even the very concept of cost has to be scrutinized. It appears in general that ''[. . .] assessing the cost-effectiveness of ICT in education is difficult, if not impossible, for at least four reasons – lack of meaningful data, variability in the implementation of ICT's, difficulty in generalizing from specific programs, and difficulty in assessing the value of qualitative educational differences'' (UNESCO, 1996). Given the idiosyncrasies of processes of educational change,

what might easily have worked in one context can fail in another. Different levels of teacher motivation, differing student populations or very different learning environments themselves pose serious obstacles to scaling up educational change (Grace & Kenny, 2003; Hargreaves, 2002). The difficulty, however, in transferring effective solutions between schools, and even more between higher education institutions, puts the very idea of estimating the costs of educational change into question. The same investment might produce very different results (European Commission, 2004).

Similarly, it appears just as problematic comparing ''cost-effectiveness'', not between different projects, but rather on a temporal scale for one and the same project. On a temporal scale, socio-economic evaluations can be grouped into ''exploratory'' and ''solid'' studies (Georghiou, Rigby, & Cameron, 2002, 168). In order to estimate the cost/benefit relation of a given project the situation at a given point in time is usually compared to a later state. ''Solid'' explorations refer in this sense to studies that compare the real state of the project at two different points in time. Exploratory studies on the other hand, are unable to use comparable data, and have to base their evaluation on observations during the project's lifetime and projected into the future. The deeper issues to which this points, however, is the sustainability of (educational) change. All too often, the euphoria during project's start-up easily wears off and the results and changes achieved are overwritten by the treadmill of old accustomed practices. What might appear as impressive cost-effective achievement during the execution or the beginning of a project can easily turn into a waste of resources once funding and initial motivation has dried up. The question then becomes not to estimate certain effectiveness at a given point in time, but the requirements for turning initial investments into lasting value. For Georghiou, Rigby & Cameron (2002, p. 220):

> Socio-economic evaluation has the major function of identifying the outcomes and impacts of governmental programmes in all their variety and scale. Such programmes need endorsement by the democratic institutions which provide the resources which allow them to occur. Furthermore, such programmes require management to ensure appropriateness and the validity of the premises upon which such programmes are based. They also need management to ensure efficiency, control and effectiveness in their delivery. Evaluation must serve all these ends. It is a vital task, and the more difficult to achieve because of the complexity of the social and economic processes upon which programmes act. Without evaluation activities, governmental initiatives are blind, lacking the means to justification and to learning, to improvement and to excellence.

However, they also highlight its limits and expectations

> Because intervention in the form of programme initiatives is intended to change the world, programmes which operate on a significant scale necessarily destroy the possibility of comparison, making the assessment of programme impacts difficult and measurements of net programme impact doubly so. Attempts to establish true net impacts

therefore must invoke hypothetical and counterfactual constructions – to focus on what might have happened without the programme. Despite the difficulty of carrying through such an aim, it is essential to focus on additionality or net programme impact to obtain any sense and measure of programme action (Ibid, p. 220).

2. The Socio-economic evaluation into action

In the design and implementation of DIYLab different assessment levels have been embedded. A fundamental one being the socio-economic evaluation to weigh the impact of the introduction of a DIYLab into schools and universities. Table 1 summarizes the different appraisal stages implanted across the project, highlighting the socio-economic assessment conducted at consortium level.

Level	Place	Procedure	Time	Results
European	External	Assessment of deliverables and general project's development.	Months 18th, 36th	Report highlighting project's strengths and weaknesses and recommendations.
Consortium	External	A quality assurance committee appointed by each participating country has assessed local reports.	Months 25th, 35th	Reports identifying project's strengths, weaknesses, at country level, and recommendations.
Partners	Internal	Collaborative action research (curriculum evaluation, focus groups.)	Throughout the entire project	Imbedded in the corresponding deliverables.
Teacher	Internal	Rubrics and cross-country assessment of DIY digital objects	Throughout the implementation process	Students' marks.
Consortium	Internal	Socio-economic dimensions	Data collected during the implementation process as a whole	Reports highlighting the socio-economic dimension.

Table 1: DIYLab embedded evaluation levels.

At the different stages of the project implementation, diverse evaluation procedures have been enacted, each of them with different purposes and methods.

3. Materials and Methods

Taking into account that the hardest limits of school change, including those promoted by focussing the main actors (students and teachers) and taking into account meaningful learning cultures and contemporary technologies, seems to be in the "grammar" of schooling (Tyack & Tobin, 1994., we have carefully considered the different elements that shape educational institutions, in Foucault's (1994) terms, as powerful social dispositive. To foster stakeholders' involvement and the sustainability of the project, we have used a methodology based on the principles of Collaborative Action Research (CAR).

> A participatory, democratic process, concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with other, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of the individual persons and their communities. (Reason and Bradbury, 2001, p. 1).

As represented in figure 1, each project's work package (WP) represents a circle of the CAR process involving all participants.

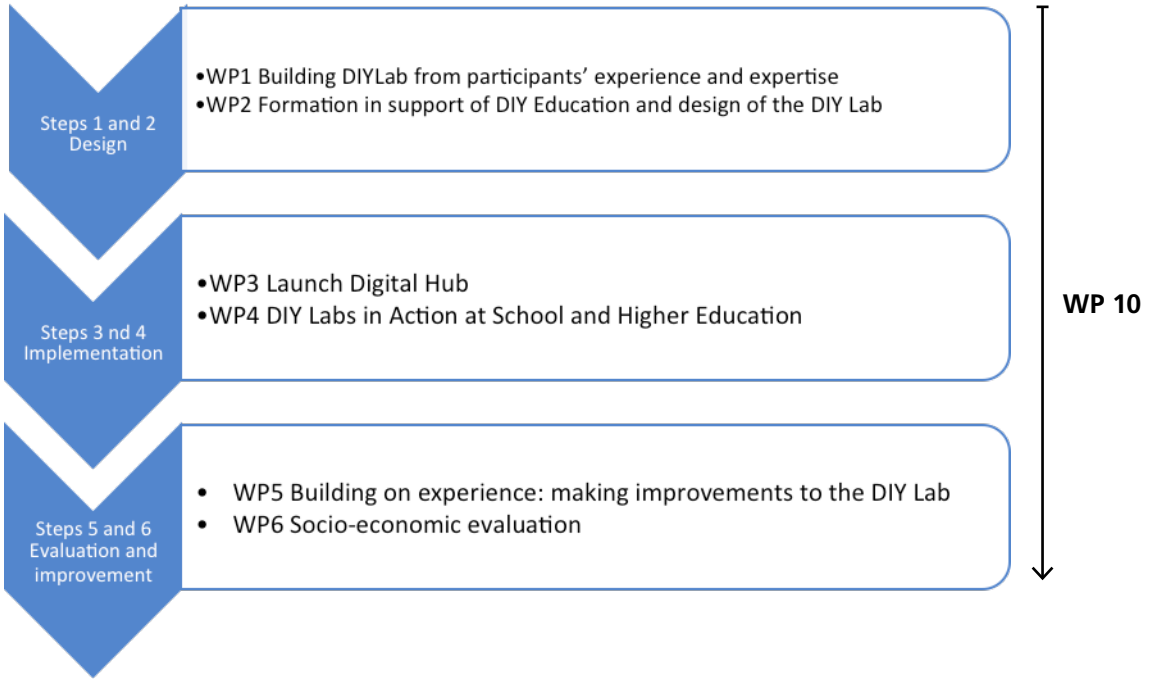

Figure 1. Collaborative Action Research circle.

Step 1 consisted of:

- The analyses of the official documents that prescribed the primary and secondary education curricula, the syllabi of the participating schools and the universities degrees involved.

- Fifteen focus groups (Barbour & Kitzinger, 1999; Kitzinger, 1995). Twelve with primary and secondary Spanish, Finnish and Czech students, teachers and parents, and three with Spanish and Czech higher education students and teachers.

Step 2 involved the development of five professional development workshops (three for primary and secondary and two for university teachers) understood as an on-going dialogical process of analysis and practice. The main aim of these workshops was to design key aspects for implementing DIYLabs in the different institutional contexts.

Step 3 involved the design, implementation, and training for the participants, of the DIYLabHub , were DIY digital objects produced in the implementation of DIYLabs at schools and university are publicly shared.

Step 4 consisted of the implementation of DIYLabs designed in step 2, in the five participating institutions following the DIY teaching and learning philosophy, based on inquiry-based projects, collaborative learning, creative problem solving, learning by doing, experiential learning, the development of critical thinking and creativity and the extensive use of digital technologies (Barkley, Cross & Major, 2004; Collins, & Halverson, 2011; Lau, 2011; Maaß & Artigue, 2013). As stated above, DIYLabs were understood as flexible spaces for developing cross-curriculum projects, where participants introduce, develop and use inquiry-based projects based on their interests, connecting different subjects and topics, and using different kinds of educational resources, in particular DT.

Step 5 continuing the CAR cycle started in step 1, entailed the organisation once again of focus groups in order to evaluate from the participants' point of view the implementation of the DIYLabs. In each primary and secondary school, three focus groups for parents, teachers and students; and in each higher education institution, two for teachers and students were implemented.

Step 6 the socio-economic evaluation draws on the analyses of the data collected through all project's steps.

In addition to data collected for the internal and public deliverables related to each WP, through all the project`s stages we have kept textual, visual and audio-visual field notes (Banks, 2001; Pink, 2011).

4. The Socio-economic Evaluation at Countries' Level

The following tables show indicators on the social and the economic impact of DIYLab in the different partner's institutions.

University of Barcelona - Spain

SOCIAL	
Impact	**Evidence** According to students and teachers DIYLab
The potential reduction of disaffection and dropout rates	• Increases students' motivation for learning from the DIY philosophy, allowing them to experiment different issues based on their own interest and motivation and with different technologies. • Goes beyond reproductive tests that do not reflect their learning. • Strengthens the fact that students can find their own productive way of learning and to develop it in the classroom. • Makes visible the skills and aptitudes of students who are part of the classroom, allowing to create working groups thoughtfully and being able to complement and enhance the learning potential of the working group's members.
The mitigation fear and anxiety regarding digital technologies	• Promotes the need (initially triggered by the teachers) of creating a digital visual object for reflecting and sharing their learning process. • Makes both students and teachers aware of the impossibility of knowing everything and the need to collaborate, even with external partners, regarding DT challenges.
The impact on the digital divide	• Promotes the interest and importance of research as well as critical thinking when it comes to accessing and interacting with DT. • Builds on the interest and need to achieve meaningful and enjoyable learning inside and outside the institution. • Can contribute to narrowing the digital divide as far as the university provides students with the necessary infrastructure. But it can also increase it as students complete the learning tasks at home and not everyone has access to the same resources.
Aspects that can spur or inhibit lifelong and life-wide learning skills related to the development of digital competence	• Both students and teachers become aware of the need of going on learning inside and outside the university.
ECONOMIC	
Impact	**Evidence** According to students and teachers DIYLab
Setting up and maintaining a DIYLabs	• In most cases, it has been possible to develop the DIYLabs with the existing infrastructure of the University. Although both students and teachers are convinced that if they had been able to access to more digital resources (computers, tablets, software, etc.), their tasks would have been easier to perform and perhaps with better results. • There is an expressed need of creating further actions in relation of the visual digital objects share in DIYLabHub, such as exhibitions or seminars to foster relationships among authors.

The cost the needed equipment and software: wiring, connection rates, computers, peripherals, computer programs, furniture, plug, multi-functional spaces, etc.	• It is necessary to have a hub where everyone can stay and share the material produced, to connect people with projects and different purposes: informational, generative, provocative • Needs a minimum infrastructure to which students have access at home or at the university. • The head on the Unit in charge of the digital infrastructure of the Education Campus – Unit that is being fundamental in the development of the educational innovation that supports DIYLab-, expressed us her concern about the difficulty for a public university to update it digital resources to the emerging necessities. Adapting spaces and infrastructure to these needs (flexible and multi-functional spaces, mobile devises, plugging, etc.) is today far beyond its economic capability.
The average cost of the infrastructure needed for families to be able to benefit from the educational use of DIY Labs;	• At home, students and teachers would require a standard PC, with multimedia capability, an updated web browser and broadband Internet connection. They also need time to improve their digital literacy skills, something difficult when some students have a part-time job, and some teachers only have a part-time job at the university.
The amount of time invested by teachers in self-study activities and the cost of needed in-service professional development.	• Increases the need providing teachers an updated professional development and students a more challenging teaching and learning situations. The main aim being they lose their fear to confront the idea that they do not know everything and do not have to know everything. Rather, teachers must learn to know accompany students in their own learning process and students must be ready to face uncertainties. • It heightens the need of spaces for sharing and learning between teachers and students, from the same degree and from others.

Escola Virolai - Spain

SOCIAL	
Impact	**Evidence** According to students and teachers DIYLab
The potential reduction of disaffection and dropout rates	• Promotes more activities outside the classroom and the playground. Any space is likely to be used • Strengthens the independent work of students. • Introduces the idea of flexibility in the way students work regarding time, physical processes, relationships, etc. • Extends learning spaces beyond the classroom and the school. • Allows to incorporate learning and experiences acquired outside the classroom and non-academic skills

The mitigation fear and anxiety regarding digital technologies	• Changes teachers' (and students) attitude. They give up the idea of wanting to know everything and take an attitude of mutual learning. • Fosters peer education within the educational community, organically, not scheduled before the start, based on the needs and capabilities of the group. • It is better developed with two teachers in the classroom: co-teaching. • It needs the collaboration and advice from colleagues or external mentors with greater expertise in the use of tools and programs
The impact on the digital divide	• Calls for the adaptation of the teaching and learning processes taking into account the students' digital skills and promoting learning among-equals, • It entails being very attentive and responsive to applications and tools that students use in their personal lives, while studying their educational potential. • It fosters a permanent attitude of teacher-learner.
The impact on the digital divide	• Calls for the adaptation of the teaching and learning processes taking into account the students' digital skills and promoting learning among-equals, • It entails being very attentive and responsive to applications and tools that students use in their personal lives, while studying their educational potential. • It fosters a permanent attitude of teacher-learner.
Aspects that can spur or inhibit lifelong and life-wide learning skills related to the development of digital competence	Stimulates • Specific study spaces, both for teachers and students, to further explore the projects' topics. • Incorporating digital technologies (tablet, computer, etc.) as a tool for study and learning at the same level as the biro, folder, book, etc. • The use of new programs, tools and applications that students bring from their outside of school environment for the realization of learning products Inhibits • The excessive use of digital technologies without considering the feelings and emotions of the students.
ECONOMIC	
Impact	**Evidence** According to students and teachers DIYLab
Setting up and maintaining a DIYLabs	• According to students, teachers and parents, setting up and maintaining a DIYLabs entails: • More support staff in the classroom with expertise in the in matters under study and / or with training on the implementation of the DIY philosophy in the classroom. • Checking schedules and the distribution of teaching time of teachers in charge of implementing DIYLabs. • Having enough time to prepare material for work and give to students based on their interests.

	• Allocating space in the Initial Course Meetings for the development of new projects DIY. • In secondary education, the allocation of compact schedules to surpass the fragmentation of disciplines. • Systematizing the meta-cognition or reflecting on the learning achieved as a DIY product (what, how and why). • Removing the time and space barriers to develop DIY projects (use of school recess hours and all areas of the school beyond the classroom). • Participating DIYLab project meetings. • Showing DIYLab products to the educational community (parents meetings and Senate).
The cost the needed equipment and software: wiring, connection rates, computers, peripherals, computer programs, furniture, plug, multi-functional spaces, etc	• A laptop per student, which contributes to the development of autonomy and responsibility for their own resources. Purchased by school to lower costs, but cost is borne by families who are helped through the foundation that manages the school in case of not being able to take charge. • A laptop for every teacher. The cost is borne by the school. • Good wi-fi system in all indoor school. • Video projector and sound system in every classroom or learning space • Plugs arranged regularly within different school areas • Furniture allowing mobility to organize spaces according to the needs of each moment. • A person in charge of computer maintenance: computer technician. • Free Software (Google) vs. payment software (Windows
The average cost of the infrastructure needed for families to be able to benefit from the educational use of DIY Labs;	• The laptop bought at reduced price to school and broadband Internet connection.
The amount of time invested by teachers in self-study activities and the cost of needed in-service professional development.	• The school should always allocate spaces for the professional development of teachers, but with more intensity in relation to issues arising from the use of new ways of learning and teaching as proposed by the DIYLAb, both of pedagogical and technological digital. This has an economic cost for the school, but it is assumed that the consequence of not providing such spaces is to move away from the challenges of real education and end up as a closed school to its surroundings. These training areas require to find time and spaces meet, to talk ... • Stimulate the use of technology by students as a vehicle for the expression of individual and collective creativity and talent in ways they feel comfortable. • stimulate use of technology by students as a vehicle for the expression of individual creativity and talent in what feels comfortable. • Inhibitt professional development activities in relation of teaching and school organization that do not take into account the digital world.

FINAL OBSERVATIONS AND REMARKS

For primary education

- It has been a very positive experience, which has resulted into a high socio-economic impact, in terms of internal school relationships with the educational community, and with a significant social impact among some external sectors of education.
- The involvement of teacher and school's management team has favoured the development of the project.
- The sharing, between teaching, of the best practices emerging from the project has led other teachers to incorporate this methodology in their way of approaching teaching and learning.

For secondary education

The participation in the project has given us the opportunity to deeply reflect, as a team, on the purposes of learning and the tools and methodologies we used. This in itself is already highly remarkable because the schools do very often a lot of work, but allocate little time to reflect. But it is even more notable when, as it has been in this case, this reflection leads us to reach a consensus and change. Thanks to DIYLab project the school has incorporated organizational, methodological and evaluation changes that have helped us to consolidate projects where students learn in an interdisciplinary way, in real contexts, putting their creativity and expertise to solve challenges collectively and where technology plays an important role for creating, communicating and sharing their learning products. With the project now all learning activities end with a reflection that helps students become aware of what we learn, how we learn it and why.

Oulu University Teacher Training School, Finland

SOCIAL	
Impact	**Evidence** According to students and teachers DIYLab
The potential reduction of disaffection and dropout rates	• According to the feedback of the pupils the DIYLab activities were able to increase the contentment in school. We are unable to evaluate the dropout rates. (A dropout relation is irrelevant in the lower school levels?)
The mitigation fear and anxiety regarding digital technologies	• New ICT methods and technologies were applied to the teaching, among the teachers of the project, but it is hard to say if it is because of the reduced fear or increased interest.
The impact on the digital divide	• The group work and collaborative methods equalized differences and gave a chance to participate also to less skilled pupils.
Aspects that can spur or inhibit lifelong and life-wide learning skills related to the development of digital competence	• According to the feedback of pupils they were anxious to pay more attention to the project work after the DIYLab activities. Pupils found that they must pay attention to the timetable more carefully in the future and they wished to have more resources (time and skills) to finalize the outputs. According to the feedback we can say that pupils find the life-long learning motivation and importance.
ECONOMIC	
Impact	**Evidence** According to students and teachers DIYLab

Setting up and maintaining a DIYLabs	• In primary school of Koskela, Oulu the teachers have rearranged the DIYLabs successfully. In secondary school, they have launched new EU project where they will learn from DIYLab project and have similar kind of activity which supports the self-regulation of high school students.
The cost the needed equipment and software: wiring, connection rates, computers, peripherals, computer programs, furniture, plug, multi-functional spaces, etc.	• There must be reasonable infrastructure in schools when applying DIY philosophy. In teacher training schools in Oulu the infra has been ready for this kind of activities.
The cost the needed equipment and software: wiring, connection rates, computers, peripherals, computer programs, furniture, plug, multi-functional spaces, etc.	• There must be reasonable infrastructure in schools when applying DIY philosophy. In teacher training schools in Oulu the infra has been ready for this kind of activities.
The average cost of the infrastructure needed for families to be able to benefit from the educational use of DIY Labs;	• Some of the secondary school pupils used their smart phones for DIYLab project. It can be seen that average smart phone is useful in activities like DIYLab. Nevertheless, in Finland it is not necessary to have infrastructure in home because we see that in school activities the school must provide all the equipment needed.
The amount of time invested by teachers in self-study activities and the cost of needed in-service professional development.	• Mutual understanding needs discussion and co-operative planning. The exact time is impossible to count. Teachers discuss for example between the classes and on lunch time. Nevertheless, it has been essential to have common time slot for planning.

Charles University, Czech Republic

SOCIAL	
Impact	**Evidence** According to students and teachers DIYLab
The potential reduction of disaffection and dropout rates	• Interdisciplinary/cross subjects collaboration of teachers; engagement of students into common collaboration cross subjects and study programs (sharing of outcomes produced by students of other study programs, feedback gained from other students; showing different approaches applied by students in another subjects and study programs); timetable arrangement of courses - time and organizational conditions for common meetings; emphasis on applicational contexts of DT (in frame of didactics of IT or DT), on content contexts of activities / work following practical usability of outcomes / topics / problems - meaningfulness of outcomes.

The mitigation fear and anxiety regarding digital technologies	• No evidence.
The impact on the digital divide	• No evidence; improvement of understanding the content contexts of usage of digital competence - connection of content and forms in work with digital competence.
Aspects that can spur or inhibit lifelong and life-wide learning skills related to the development of digital competence	• Spur: possibility to visualize (learning) processes and subsequent communication/ sharing (own) ideas/ procedures; links and connections of training in digital competences in a context of solved (pedagogical) problems. • Inhibit: interdisciplinary collaboration with students; incompetence to apply DT as a tool to record and visualize learning process.
ECONOMIC	
Impact	**Evidence** According to students and teachers DIYLab
Setting up and maintaining a DIYLabs	• No evidence; English translation - according to student and teacher language literacy.
The cost the needed equipment and software: wiring, connection rates, computers, peripherals, computer programs, furniture, plug, multi-functional spaces, etc.	• Small cost for specific equipment (sensors, Arduino, etc.) to provide HW for student projects with usage of specific DT (low-cost). This is unusual in 'normal' teaching because the area of interest of students is wider,
The average cost of the infrastructure needed for families to be able to benefit from the educational use of DIY Labs;	• No in higher education
The amount of time invested by teachers in self-study activities and the cost of needed in-service professional development.	• Cost: No cost of needed in-service. But the budget for teacher self-study and professional development (conferences, teacher community meetings etc.) would be useful if it was possible. • Time: Teachers had to spend more time then normally for preparing their DIY activities. They also spent more time in meetings with other colleagues participating in the project (discussions etc.) and in own action research related to their activities.

ZŠ Korunovacní, Faculty School, Czech Republic

SOCIAL	
Impact	**Evidence** According to students and teachers DIYLab
The potential reduction of disaffection and dropout rates	• DIY Lab has an important potential to change the school atmosphere, during the project realization all teachers, classes and individual pupils cooperated with each other.

	• In our school the project realization had important dimension – pupils (groups of pupils) made educational tools for younger pupils, looked for suitable methods and organization of the educational process, taught in classes (explained the new material, made revision and did exercises) – it was totally new experience for everyone
The mitigation fear and anxiety regarding digital technologies	There are three groups of teachers: • Teachers, who due to different reasons are against involving digital technologies into teaching process, we can call this group – 'non-digital teachers' – this group's attitude to the digitalizing of the world (school) is very critical – these teachers feel it like risk for them and children, they have made their own opinion regarding the time spent online, email communication, using digital technologies in class and they don't want to change it, some of their arguments are quite relevant, these teachers used other principles but not digital in the DIY Lab. • Teachers, who use digital technologies in classical spheres, e.g. searching information, photo and video documentation, graphic processing, they got this knowledge in the past, it is enough for teaching, they were able to use knowledge and experience during the DIY Lab project, but they didn't use the project for improving their digital skills. • Teachers – 'digital experimenters', they used the DIY Lab for their own development in digital competence, e.g. they used SW for some new unusual purpose, they used new SW and HW functions for interactive tables, together with pupils they learnt the new SW for cutting video, it means they took advantage of DIY Lab to develop themselves in that sphere. • During the DIY Lab there wasn't any pressure on the first two groups of teachers, they were able to choose whether to use digital technologies or not, it was very interesting to compare outputs from different experience – meeting digital and non-digital spheres, both approaches are legitimate, they have irreplaceable role in education and in future it looks like in our school there will be combination of the two clear-cut approaches rather than pressure in order to digitalize educational process.
The impact on the digital divide	• Teachers in our school don't perceive the existence of 'digital divine' as something negative, non-digital approach doesn't mean non-competence, doesn't mean lower quality, doesn't mean any problem, it is the question of individual choice of methods and approaches, community 'Creative School' recognize freedom of choice during the educational process and don't perceive non-digital teacher as a problem, BUT WE WANT AND MUST MAKE OPPORTUNITIES TO WORK WITH MORDEN DIGITAL TECHNOLOGIES. But at the same time, we don't want and can't forget about hand-making creative tools, working with clay, painting …
Aspects that can spur or inhibit lifelong and life-wide learning skills related to the development of digital competence	• School focus, school priorities. • School participation in projects focused on digital education. • Education in the field of digital competence – the priority in the system and plan of teachers' education. • Availability of special technics (microscopes, statives, video cameras, IT support in solving technical problems). • Experience exchange between schools focused on digital education – partnership.
ECONOMIC	
Impact	**Evidence** According to students and teachers DIYLab

Setting up and maintaining a DIYLabs	During the DIYLab only the work of three school coordinators was financed. In the field of actual school necessities: • We don't have laptops of good quality for all teachers and there are not enough technical tools in classes (interactive tables) – we are only partly equipped, that is big obstacle for further development of digitalization. • We currently have minimal quantity of digital equipment (photo cameras, video cameras, scanners etc.) of high quality, e.g. with the possibility to film the movements in a slow regime, to take macro photos, to take underwater photos, etc. • The quantity of available digital technologies and SW greatly influenced the implementation of the DIY Lab.
The cost the needed equipment and software: wiring, connection rates, computers, peripherals, computer programs, furniture, plug, multi-functional spaces, etc.	For example: • Interactive tables – 80000 Kc, we need 12 pieces • Laptops for teachers – the price is approximately 10000 – 15000 Kc, we need 20 pieces • Video+photo+communication tools – the price is approximately 20000 KC, we need 20 pieces • New specialized classrooms for physics and chemistry – we have project – totally1,5 million Kc (including digital equipment) - we have calculations and are going to apply for the EU grant-
The average cost of the infrastructure needed for families to be able to benefit from the educational use of DIY Labs;	• Minimal equipment for pupil/family: 1 laptop – the price 10000 – 15000 Kc. Internet – the price 250 – 500 Kc per month.
The amount of time invested by teachers in self-study activities and the cost of needed in-service professional development.	In the conditions of our school there are the following aspects: • It will be necessary in future to equip teachers with mordent compact technics including the possibility of quick and non-problematic Internet connection. • It will be necessary to educate teachers continuously in the sphere of working with new digital tools (programs, technics). • It will be necessary to arrange non-problematic quick printing of colour documents in high quality. • It will be necessary to show the principles and possibilities of sharing information, the abilities of modern technics, the possibility of using educational portals – it means to educate teachers systematically and to include digital sphere into the educational system (it is the priority in education, which is given by actual problems of teachers and schools in the field of personal development, using effective didactic approaches, working with minorities, working with the pupils who have learning disabilities etc.).

5. Main contributions

DIYLab is a relatively small European project that aims to introduce a relatively big change in three primary and secondary schools and two universities from three European countries. In this kind of project, cost-efficacy is understood as the ability of the partners to meet the project objectives and perform the planned activities in time

and with an acceptable level of quality. However, when one of the aims of the project is to foster its sustainability beyond the implementation time, the socio-economic aspects must not only indicate the immediate economic requirements for starting, but also the capacity for providing a lasting impact beyond initial funding. So, when speaking about socio-economic evaluation we have to avoid "an overly reductionist approach […] by acknowledging the social, human, professional and institutional costs alongside the purely economic costs of educational change". This is a first step "in unlocking the complex nature of such an undertaking." (Müller, Sancho, Hernández, Giró, Bosco, 2007, p. 1177).

DIYLab project identified a set of possible educational-social benefits and a set of costs to be taken into account to foster its sustainability and possible scalability to other contexts (see tables 4 and 5).

DIYlab educational-social benefits

Educational-social benefits	Collateral effects
• Potential mitigation of teachers' fear and anxiety regarding digital technologies	• The proliferation of DT resources and applications overwhelms teachers with no time to be updated.
• Potential reduction of school/university disaffection and dropout rates	• Tensions between a self-managed philosophy and the obligations imposed by educational institutions.
• Potential reduction of the digital divide.	• The intensive technological development and slow investments in education can increase social inequalities and the digital divide.

Table 4. DIYlab educational-social benefits.

DIYlab costs

Costs	Implies
• Setting up and maintaining a DIYLab	• Cost related to the analysis of current teaching practices, the professional development of educators, and the design of the DIYLabs (how, why, where, who, which equipment).
• Time investment needed by educators and other educational actors, also taking students into account.	• Who will pay the cost related to the time invested in the different phases of the innovation? Will it be the responsibility of teachers or the institution? Should the teaching and learning schedule be changed? Should the institutional space be modified?
• Equipment and software needed	• Cost related to the acquisition and maintenance of the technological infrastructure. Previewing the social impact of bring-your-own-devise philosophy.

Table 5. DIYlab costs

The first foundations of the project sustainability were laid in the CAR process that converted university researchers, schoolteachers, students, and to some extent parents, into learning communities. Teachers and students explored their current institutional contexts and perceived needs. Schoolteachers and researchers implemented the professional development workshops in collaboration and decided the content and shape of the DIYLabs for their educational level. Periodical meetings at country and consortium levels followed up the implementation of the DIYLabs and the project as a whole.

The setting up and maintenance of a DIYLab involves a large amount of time, knowledge and skills. In our case, after investing six months in exploring, in each institution, the initial strengths and weaknesses to implement DIYLabs, another six months were committed to the professional development of teachers, which included pedagogical and technological knowledge and skills. The implementation or the DIYLabs throughout a whole year involved an extra concern, time and work for teachers and students. Both of them had to develop new knowledge and skills recognised as thrilling, but also as challenging ways of learning. The time issue was repeatedly pointed out by teachers and students; a question that will gain weight once the partially financed project is over if the involved institutions want to sustain the innovation implemented. This dimension has to be carefully taken into account by any institution wanting to achieve the same aims.

Authors such as Illouz (2007) reject the conventional idea that capitalism has designed a society dominated by rationality and bureaucracy in which economic behaviour conflicts with emotions and intimate, authentic relationships; in which the public and private spheres are antagonistic and that true love is opposed to calculation and self-interest. On the contrary, for this author, capitalism has fostered an intensely emotional culture - in the workplace, in the family, and in our own relationships.

In this context, despite the constant attempts of converting education into an *effective* bureaucratic machine, education is profoundly permeated by emotions, love (or hate), and the idea of care, service and contribution to societal improvement underpins most educators' behaviour, even at higher levels. As a result, due to their feeling of responsibility, educators may end up paying an important part of the cost of the innovation with their time and extra-emotional involvement. At this point, fundamental questions are:

- Who will pay the cost related to the time invested in the different phases of the innovation?
- Will it be the responsibility of the teachers or the institution?
- Should the teaching and learning schedule and spaces be changed?
- If so, what will be the implications for teachers, students, parents and families?

Another set of costs relates to the need of updating equipment and software. Institutions participating in the project were relatively well equipped and, in most cases, students have access to digital resources outside the institutions. However, some

teachers felt overwhelmed and complained about the extra work that the project represented and the lack of finance for equipment. This kind of cost is particularly worrying at a time of intense technological development and slow investment in education. In this context, educational institutions may have a hard time keeping their equipment updated and paying the maintenance bills. On the other hand, the bring-your-own-devise movement, which shifts the economic pressure onto families, is gaining ground. As a result, social inequalities do not only remain but can be increased by widening the digital divide.

The professional learning context created by the project contributed to mitigating teachers' fear and anxiety regarding digital technologies. However, as it has been glimpsed at in the previous section, teachers felt somehow more pressurised when realizing they would need much more time and more knowledge about inquiry-based teaching and learning and about DT. The speed and the amazing proliferation of DT resources and applications overwhelmed not only all educational level teachers, but also some students and parents who could not find the time to be updated. The need for institutions to provide time and professional development for teachers increases the cost. This is particularly significant at university level, due to the fact that academics have to add research and publications to their professional agenda.

Students felt they had more freedom to pursue their own interest and more engaged inside and outside institutional activities. This is an indicator of the project's potential to reduce institutional disaffection and dropout rates. However, those students that have found their *comfort zone* (Brown, 2008; Ellsworth, 2000) in highly regulated educational contexts, teacher, factual knowledge and test-centred, had a hard time when asked to think and act by themselves. On the other hand, it also opens a fundamental challenge related to the social and digital divide, as not all institutions and families have access to the same kind of equipment, not all students have the same cultural and social capital (Bourdieu, 1986) and some of them may suffer a new kind of social and educational discrimination.

6. Conclusions

A long time ago, writers such as Seymour Sarason (1990) pointed out the predictable failure of educational reforms. Michael Fullan (1999) argued that transforming a secondary school requires more than 6 years. While Stensaker, Välimaa & Claudia Sarrico (2012) showed up the complexities of transforming higher education institutions.

At the same time, since the *computer age*, authors such as Seymour Papert (1979) and many others, followed by corporations, are granting digital technologies with the *magic power* for transforming education.

Digital technologies are defining new landscapes for all human spheres, posing unprecedented challenges for education and training. In this context, DT, more than a straightforward answer to educational challenges is becoming a new problem to be solved by people, sometimes with little knowledge and understanding of these technologies. The challenges of this new scenario involve rethinking the organizational

metaphor of educational institutions as a whole, putting into question the notion of knowledge, the visions about teaching and learning, the role of teachers, students and administrator, the organization of time and space, the function of assessment, the concept of leadership, etc. (Domingo-Coscollola, Arrazola-Carballo, Sancho-Gil, 2016; Hargreaves, Boyle, and Harris, 2014).

In the DIYLab project, we aimed to deeply and sustainably transform teaching and learning practice in primary and secondary schools and higher education institutions by introducing enhancing synergy between these three educational levels and the DIY philosophy, in order to expand digital competence and foster student agency and collaborative learning. For this reason, we paid special attention to the institutional dimensions of innovation and considered the DIY philosophy as a way of making the most of DT and learning.

Considering the socio-economic dimensions of the project, it has allowed us to make explicit the possibilities, tensions and difficulties we have encountered. This knowledge will guide our next steps in innovation, once the European project is over, and can help educators and institutions to responsibly implement DT-driven innovations.

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