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Final evaluation report: Implementing a DIY Lab in the primary and secondary school and in higher education

- June 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

UNIVERSITY OF OULU

Comisión Europea

Lifelong Learning Programme

Contents:

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“Final evaluation report: Implementing a DIY Lab in the primary and secondary school and in higher education”

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Introduction

Three project countries have written their own local evaluation report about the implementations. In this report, most of the findings and analysis are presented like they are in the local reports according to the country and the school. During the project, we have found out that schools, universities and teaching are highly related to the local culture and society. Therefore comparison between findings, detached from the context and origin country, could in some cases lead to false conclusions.

To help reader to make his own comparison and conclusions, this report collects the outcomes thematically, from all the countries of the project and the schools. The structure of this summary report is similar with the local reports and every chapter has a short review of findings pointing out and analyzing essential considerations.

1. Aims of WP5

The objectives for WP5 and, therefore, for this report are:

1. Identify and analyze the strengths and weaknesses of DIYLabs, stressing on the development of digital competencies and the feasibility of the implementation of DIY philosophy in formal education.

2. Draw up specific recommendations for improving DIYLabs, taking account of foreseen specifications of WP2.

2. Methodological dimensions

Regarding the key purposes of the project and based on the earlier work in WP1, teachers, students and families have been involved to the project. In this WP5, all countries organize focus group discussions for them and gathered data and findings about implementation of the DIYLab.

This chapter is splitted in three parts, which shows the The first part consists of a report of the analysis of the focus groups held in Virolai school. These groups involved teachers, families, 10-11-years-old students from primary classrooms and 14-15-years-old students from secondary classrooms. The second part describes the pedagogical, technological and organizational specifications; as foreseen in the deliverable D2.1 where the training process developed during WP2 was reported. It concludes with the formulation of proposals to improve future implementations.

2.1 Focus groups

In each project country, University members of the project were coordinating the conversations and explained to attendees that the aim of the meeting is to share experiences, in relation to the implementation of the DIYLab; in order to promote reflection, as well as to explore the implementation from different perspectives. The coordinators used open questionnaire prepared by the university of Oulu, Finland, to allow all partners to work with the same guidelines and afterwards, to be able to share and compare similar information (annex 1).

Details, like dates of the focus group meetings can be found from the local reports.

2.1.1.Composition

SPAIN:

We organized six focus groups, one for each grade and collective. This has allowed us to collect the experience of the implementation from different positions and gazes, thereby deepening in the implications generated by the activities. In addition two focus groups were organized for the university.

Education	Participants total
Primary school(5th)	4 students 4 teachers 3 family members
Secondary (3rd of ESO)	7 students 5 teachers 5 family members
University / Higher education	9 univ. students teachers from 6 subjects

FINLAND:

Three focus groups were kept on the primary school and three in the secondary school. The university people and the headmasters of schools organized the meetings. As in the earlier WP1 focus groups, getting

the group of parents into interview was challenging. The event was eventually carried out together with another event which was targeted for the parents of classes.

Note: Finland did not have the higher education / university students in the project.

Education	Participants total
Primary school	34 students 6 teachers 6 family members
Secondary school	6 students 6 teachers 4 family members
University / Higher education	n/a , Finland did not have higher level students in the project

CZECH:

At ZŠ Korunovační, a total of six focus groups took place. Each meeting was attended by at least two researchers, when one always recorded notes from the discussion. Meetings were organized in the first half of April 2016. The first were held the meetings with pupils, then with teachers and lastly with parents

In addition two focus groups were organized for the university.

Education	Participants total
Primary school	5 students 4 teachers 3 family members
Secondary school	10 students 4 teachers 5 family members
University / Higher education	21 students 7 teachers

Review

All three project countries did the focus group discussions well and as planned. From the local reports and scheduling, it seems that organizing the meeting for the family members was the most difficult, but eventually all groups and discussions were fruitful and informative..

2.1.2 Outcomes

In each project country, the contents from focus groups have been translated and analyzed, using a categories, which are in line with the initial questionnaire. Because the focus groups differ from each other about aim, age, school level etc., only relevant topics have been under discussion.

Categories include lots of details and each country has its own way to present the outcomes. To help reading of the report, outcomes of different focus groups are marked with different color.

- **DIYLab activity:** Environments, contexts, relations with curriculum, differences with other kind of activities in which the DIY philosophy has not been taken into account, etc.
- **Attitudes and roles:** Working with DIY philosophy as a way of relating to learning, motivation, disaffection, doubts, changes of role, differences regarding other kind of activities in which the DIY philosophy has not been taken into account, etc.
- **Technological aspects: I**ssues related with technology –digital or not– highlighted during the implementation of DIYLabs (competencies, softwares, evolution in the use, discoverings, digital divide, etc.).
- **Influences emerged:** Transfers between in and out of school, cooperations among school, university, families, society, in any way.
- **Sustainability of the project:** Which sustainability has the project? What does it need to achieve it? Are there certain possibilities of improving? Relations with curriculums, etc.
- **Assessment:** kind of assessment carried out throughout DIYLabs , reflections, etc.
- **Other issues**

SPAIN:

The tables below show a summary of the results of the analysis of the focus groups – differentiating primary/secondary and teachers/students/family members–.To a brief presentation of the activity carried out follows the thematization, in order to move towards the identification of strengths, weaknesses, difficulties and challenges in each case.

PRIMARY

DIYLab was developed within the transdisciplinary project schedule -social sciences, catalan and spanish-, which is related to the initiative Tivo Creativo, where students design a smartphone application to improve their daily lives.

Students		
	Strengths/Challenges	Weaknesses/Difficulties
DIYLab activity	・Work in groups based on their interests, with subjects that like them. ・Freedom of choice ・Work in different spaces of the school, not only in the classroom ・Work with laptops and tablets ・More interactive classrooms in which they can speak more among them without being warned	
Attitudes and roles	・The transdisciplinary project in which DIYLab was implemented was the most engaging for them	
Technological Aspects	・Use of software for presentations: powerpoint, Canva, Prezzi・Use of web applications for working in groups: Google Drive ・Use of software to organize information: Microsoft Word・Use of laptops and tablets, improving in their digital literacies as well as in th registration and edition of video	
Influences emerged	・Use of specific skills learnt at school in scholarly activities out of school ・Collaboration with families, especially in the use of digital technologies: they learn from their siblings and sometimes from their parents. Although, they accept that usually parents don't know so much about digital technologies and are the children who teach their parents.	・There is a lack of awareness in transferring their knowledge or interests acquired out of school into classroom. That was visible in the activity of designing the smartphone application.

Sustainability	・Wish to spread the methodology to other subjects, shifting towards a more fun and interactive way of learning. ・Keeping extra human resources. In this case, it was helpful that Judit (doctoral student), Maria (researcher at University) and other student teachers support them in classrooms.	
Assessment	・There were no comments about it	
Other issues		・The times demanded for curriculum are not appropriately to children's rhythms and times of work.

Teachers		
	Strengths/Challenges	Weaknesses/Difficulties
DIYLab activity	・Introduces the reflective dimension in the processes of teaching and learning. Likewise, fosters student´s awareness of their own learning through the journalist activity of recording themselves asking about their learning processes ・Work based on the students' interests* ・Possibility to rethink themselves as a teachers ・Learn to don't get obsessed with their "unknowns" and try to find other strategies for guiding students or learn with them: *"I don't know if that happened to you, but in my case, I had the need to control anything, and if the child wanted to make a video, in that moment I must help her to achieve it, right? but the problem was that I had no idea to make videos! Then, I told her -Well, it's fine, we will do together; take some images, and after that we will write a script, and I with you will learn to make the video. And right now I understand [teaching] differently"* (Teacher 1)	・Some of them think that this kind of projects are not appropriate for children, due to a maturity problem
Attitudes and roles	・The role of teacher is evolving into a mediator role. They are starting to negotiate more with students the balanced position between their interests and curriculum ・- More dedication and specialization of teachers in this kind of projects ** ・Work in projects usually is more engaging for students	・Not all the students are engaged working in this way. ・There are some contents important for them that this methodology not always allows to be introduced in classroom.

Technological Aspects	・-The students integrated digital technologies in their day to day: *"introducing laptops has been so positive and are another tool, like cardboard if they have to make a poster, or they have different materials to make a model.... Work with appropriate tools in their appropriate moments, make students normalize [the use of digital technologies]....If the first day [of classroom] you give them a notebook, a pencil case and a laptop and say to them: "look, all of that is what we will use, and we are going to use it in this way"*, they integrate it so naturally" (Teacher 1) ・They don't consider there is a digital divide between them and the students, although they acknowledge that sometimes they learn with or from them, as well as among teachers.	・The problem of students' maturity was more evident in the searching of information, as they didn't work with the limited and defined virtual space of the school, but rather they were challenged in an open search through internet
Influences emerged	・It has fostered the organization of courses and different workshops for students and teachers related with digital technologies.	
Sustainability	・In order to assurance certain sustainability for the project, it is necessary to rethink it, making an emphasis in the conditions for students' freedom.	・We should take more in account the curriculum and don't leave so much freedom of decision to students, because many times they feel lost
Assessment	・Introducing rubrics in assessment allowed students assess each other as well as themselves.	
Clarifications: * Some teachers are agree that working based on students' interests lead to an improvement of results and learning, whilst others think the opposite. ** When it talks about the type of dedication and expertise of teachers in this kind of projects discrepancies arise. Someone value the role of generalist teacher with students who may be all hours of the day with them, while others appreciate this combination of space and time with different teachers because they provide a knowledge and working strategies and other others.		

Family members		
	Strengths/Challenges	Weaknesses/Difficulties

DIYLab activity	・Working from students' interests, enabling them to: (1) learn to work with classmates that otherwise they hadn't chosen to work with; (2) know better their classmates (there were some children that discovered they had common interests with other classmates ,); (3) learn to put shared interests above friendship. ・Working collaboratively and with groups, allows students to: (1) share knowledge among them more easily; (2) learn to open up to the group, to listen to their classmates proposals, and to accept different ways of work; (3) learn to organize themselves to carry out a common project.	
Attitudes and Roles	・Some children open up more to their classmates, losing their fears and becoming more self-confident. ・Students take more risks when making decisions. ・Students engagement augmented when working under this methodology* ・Differentiating between motivation and commitment: when they talk about commitment, they recognize that working this way allowed children to develop a certain sense of compromise and responsibility for their work and their classmates' work.	
Technological Aspects	・Incorporation of digital technologies in the students' day to day ・Normalization of the use of students' image by the School for dissemination of different activities carried out, through virtual platforms ・They consider the digital divide as an advantage, because it allows parents to learn from their children; children to learn among siblings, etc.	・Difficulties and concerns for establishing the limits on the use of digital technologies, being aware of how children have incorporated them in their daily lives. ・Unnecessary overuse of these technologies, putting aside the management of emotions. ・Acceptance of the existence of digital divide, since their children master much better different digital tools than them, as well as they know how to take more advantage of that.
Influences emerged	・Transference between what children learn in the school and how they work or play in home: facility for driving creativity through brainstorming, mapping or making visual presentation using some software similar to Powerpoint. ・The level of engagement for family members in this kind of projects varies according to demand. Generally they accept to collaborate or to get involved in excursions, searches around the city, etc. On the contrary, they don't feel the demand to collaborate in these projects or to take part in some classes. They would prefer it stays this way.	

Sustainability	・They consider viable this kind of project, if appropriate training for teachers and students is provided for.	
Assessment	There were no comments about it	

Clarifications:

* Discussing if this methodology is more engaging for students or not than a more traditional methodology, some discrepancies have been arisen. Some of them think that children attend such class more happy and motivated, whilst some others consider that it not only depends on the methodology, but rather on the subject and its contents taught.

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SECONDARY

In the DIYLab students have been developing a transdisciplinar project (technology, biology, social sciences and languages) related to Smart Cities issues, in which they created a product or application to improve their city.

Students		
	Strengths/Challenges	Weaknesses/Difficulties

DIYLab activity	・Do research to find information and turn it into knowledge. They are motivated in try to know what is right, work themselves, etc. ・Advance without an initially predetermined guide by the teacher. ・Possibility to put their focus in a general framework planned by teachers. ・First, learn the basis of the issues that they are interested in, and then start to work and decide what need to learn more deeply. ・Create the work groups based in the interests and level of learning. Hence, they have been able to work with horizontal organitzation. ・Use spaces where they can organize in small groups, have mobility and create dynamism. ・Project in a real context and close to students because the problems are known for them. ・Participate in a european project ・Share their projects in a public platform as an added value.	・Short moments for reserch・- Some moments with little liberty for decide and with plus external regulation*
Attitudes and Roles	・Changes with the learning attitudes: be more “adults”, motivation, to build, learn to manage the autonomy, resolve doubts, concentration, curiosity, independence, self-sufficiency, team work, responsibility and organization. ・Increase effort, dedication, and the thoroughness with the project because of itspublic projection. ・Simplifying complex issues thanks to collaborative work with classmates and teachers. ・Help and collaborate within each small group. Distributions of tasks based in interests and abilities. ・The emergence of more horizontal learning, causing teacher’s roles to change to someone who also learns from situations that occur in the classroom. ・They want to learn to be constant, get strive and organize themselves. Not for impositions but for necessity.・Learn skills and attitudes that can be exported outside school and be useful for life in general. ・Involvement as a requirement for carrying out projects, and this appears if there is interest. ・Time and willingness to get adapt to work differently.	・Disorientation and strangeness with the unknown issues, spacially in the early stages of the project・Autoregulation, autonomy and decision-making are not always capacities easy to manage, so students request the adult accompaniment in the process.・Lack of connection and collaboration between different groups.

Technological Aspects	・Discovery of technological resources such as: Codecademy, Raspberry Pi and Python because the projects had a strong technological component. ・Applied learning of these resources in practical situations increases the motivation and the value of the activity. ・Intuitive discovery (motivated bythe necessity) of applications and digital programs in the process of creating the digital object DIY such as: Camptasia and Scratch. ・Make autonomous decisions related to applications or programs used to create DIY digital objects ・Use the software, applications and environments found in the process of the project to other areas of their lives. ・Use digital resources such as: Google Hangout, Skype or WhatsApp (specially voice messages) to communicate in independent work moments outside the classroom. ・Security and mastery of the situation thanks to the basic knowledge learned before starting the project, proposed by teachers. ・Decreased anxiety when learning new technological concepts thanks to plan the activity before starting work. ・Regulation of rhythm and intensity of dedication to new technological issues for them. They prefer not be all the day with an activity in which feel insecure and need to make more effort. ・Students have not detected digital anxiety in the professors	・Initial confusion in the process of learning some technological resources, also owing to the new rol of teachers as accompanying teachers ・Failures in internet ・Only worked technological issues with technology teacher. In the other moments when they have contact with digital resources, teachers not had an active role.
Influences emerged	・Some acquired capabilities and attitudes developed, they use to out of school, for instance organizational skills. ・Transfer of technological knowledge in / out of the school, and between school mates, when they consider that is interessting. ・Collaboration with families. Students follow two strategies: (a) ask for help or advice during the process, and b) asking for opinions on the results	・Lack of moments of cooperation and communication between the institutions participating in the project. Seems interesting to share ideas and projects enabling new insights, and learning interesting crossroads.
Sustainability	・Very interested in continuing to work this way. They can learn from themselves andin a more entertaining manner ・Enables them to learn to learn, which will be useful for the rest of their lives allowing them to be self-sufficient leaners.	

Assessment	・They assume that the teachers evaluated them according to the following criteria: the level of individual involvement, attitude to solve problems, and finally, the results. ・Making co-assessment processes between members of the same group, using a rubric. ・Satisfaction with methodology and evaluation process carried out: they think that is fair and reflects what they have learned, especially in moments of independent work outside the classroom, where the teacher is absent.	
Other issues	・Learning time management in order to reduce the feeling of anxiety. ・Creating a calendar agreed between all the participants at the beginning of the project, in order to be organized.	・Lack of time to achieve more meaningfully learning. Especially the first time that one works and explored a theme.
Clarifications: * Some students say that some kind of regulation is positive to them.		

Teachers		
	Strengths/Challenges	Strengths/Challenges
DIYLab activity	・Chance for students to create ・Do a first phase of brainstorming without filters, and a second in which we have worked to convert it in feasible ideas. ・Offer a common framework for all student needed to make all the goals achievable.	・A little bit confusion with the manage of transdisciplinary's activities planned, specially the first times*
Attitudes and Roles	・The construction of DIY digital objects as a helpful practice ・Working from interests: increased motivation especially students academically fair... ・Abandonment of traditional way to organize classes: teacher transmit the contents and makes tests to evaluate.・First start to work and then search for the information needed to advance ・Teacher as a companion , working together with students. ・Ability to solve problems and improvisation in situ by teachers, especially in unforeseen situations or that require a change. ・Allow ideas to pollinate each other, in order to make them bigger and better. ・Learning to learn ・Do not censor learning process ・Promote creative attitude of students when planning・Development of communicative competence ・Development of negotiation and discussion strategies・Development of responsibility, planning and process management.	・Initial fear to descontrol・Attain that students have criteria to find good information and to determine what is actually important.・Bad management of autonomy by some students.・A little bit of confusion, but an increase in the effort because of the methodology change.

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Technological Aspects	・Understand programming language is needed to understand the operation of technological devices in general.・The option of more active student's participation in those parts of the project where they feels more comfortable.・Have a positive attitude and support towards fellow teachers, to allow teachers with more technological difficulties to carry out certain activities ・Relationship with technology as a basic need such as read or write. ・Promoting autonomy and creativity in use of tools, programs and technology applications by students when creating their DIY digital objects ・Learn with students	・Some of the technological activities planned (as a basic knowledge) produced some aversion to some students (usually girls) who made known their little interest in content. ・Arisen of digital anxiety in some teachers with interest in technology, due to the digital presence in much of the activity. ・Speed difference in learning new technologies and the acquisition of digital skills among teachers and students ・Constant failures in the wi-fi connection due to the bandwidth.

Influences emerged	・Students of secondary / elementary students: collaboration with the English translation of its digital objects. ・Students / teachers: discovery of some digital tools・Society / Student / School: Students act as a bridge between school and society, creating knowledge transfer in both directions. ・College / University: the project has allowed move items, put them in common, learn from each other and give the necessary push to school to encourage new ways of interacting with learning.	
Sustainability	・Is guaranteed because it is already underway. Students who implement the project, are working using the same methodology, which is allowing them to get far in their projects. ・School is building its own version of the DIY philosophy, adapted to their institutional reality, of students, etc. ・The DIYLab is being applied in other courses.	
Assessment	・Evaluation using rubrics: if we change the idea of learning we must change the way of evaluating. ・One of the objectives i to promote the internalization of what we has been learned and how it is.	・Strangeness when analyzing the learning process for the first time.
Clarifications: * However, the difficulties arisen were solved.		

Familiy members		
	Strengths/Challenges	Weaknesses/Difficulties
DIYLab activity	・Creation of work groups based on student interests, not on friendship relationships as usually happens. ・Possibility of carrying out independently part of the activity on the street. i ・Possibility to choose the topic ・Documentation and montage of the process ・Having a challenge to solve, of which they know practically nothing about. ・Flexible schedule to allow students manage their work themselves	

Attitudes and Roles	・Involvement ・Fun ・Self-management ・Changing of teacher's role, from transmitter of knowledge to companion, reaching to more horizontal situations. ・Families also have a DIY attitude that promote at home: when children ask, parents assume they do not know the answer and demonstrate an active attitude when searching for information. Moreover, they do not solve directly the problems that arise, but first allowthe children to try solving it themselves, and if they fail, then they help.	・Some discussions and tensions between groups because something does not go well (especially technological nature) or lack of time.
Technological Aspects	・Use of digital technology among members of the same group, at times to work independently outside the school. ・Freedom of choice of systems of communication between students, in the moments of self-employment: some students choice digital technology (Facebook, chats, hangout, skype, whatsap) and others in person. ・Discovery of Google Drive, which has been a success. ・Possibility to choose the way of work, promoting concentration in certain children.	・Technical difficulties: files that weigh too much and they can not pass through mail or send mobile microvideos to computer or problems with any type of file forma that they ignore ・In general we are dependent at maximum level of technologies
	・Persevering attitude by students to solve technical problems. They make tests based on what they know and what they sense, or they seek on the Internet, or ask it at home if someone in your family is professional of the field in question. ・ ・Young people use the technology with a lot of facility, it's not important what type of device is in question (tablet, phone, computer, etc.), or what operating system or which program. ・Promoting the educational use of technology, introducing computers and phones in classrooms, and teaching students to use them productively. Not only as entertainment or to have access to not recommendable contents ・Finding the boundary between the will of helping boys and girls becoming very skilled with digital technologies and the fear of going to fast when promoting relations with technology. . Sometimes families need to set guidelines and limits for their children, in order to allow an appropriate and responsible use. ・Expanding the sources of information provided by the textbook thanks to the arrival of the internet to school. ・Evolution from consumer to prosumer	・Existence of schools with high resistance to technology. ・There are too much platforms, blogs and various digital tools that finally end up disoriented us.

Influences emerged	・Families to students. Students demonstrate three attitudes: (a) those who seek help from some members of the family when they have knowledge of a specific subject (computer, etc); (b) those who do not ask for help; that causes frustration to the families, but is interpreted as they are gettingt along; and (3) those who require that families review the results of what that they have done.	
Sustainability	・Families are really happy with their children's attitudes. They believe that these attitudes go beyond motivation; that are the result of having assumed a certain methodology and applying it unconsciously.	
Assessment	Comments regarding the subject of evaluation have not appeared	
Other issues	・Enthusiasm for the work done by the school in recent years to reach the point where they are now. Especially in the progressive abandonment of masterclasses and the gradual emergence of technology.	・The lack of time, or poor organization of the students has caused tensions in some situations and discussions in working groups.

UNIVERSITY

UNIVERSITY STUDENTS		
Theme	**Strengths/Challenges**	**Weaknesses/Difficulties**
DIYLab activity	・Establish connections and transfers between different disciplines and fields of thought. ・Integrate learning processes, reflect on them, represent and share them. ・Develop a method, a way of doing. ・*"For me it was a double challenge, because I opened many possibilities, many more than if the teacher had told me "do so". All these possibilities simultaneously become responsibility because you have to put into play, or connect different knowledge, different strategies, and you realize that a very large a very large range of possibilities opens"* [St. 3]. ・Combine different competences: analytical, observation, planning, and content structuring. ・Be able to feel integrated, recognized and motivated. ・Raising awareness of self, not feel constrained by something imposed. ・Increase the autonomy of autonomous persons. -Need to accompany more intensively to the less autonomous ones. ・Enhancing participation and meaningful learning. ・Encourage creativity and make people aware of their potential ・The feeling of openness, freedom, responsibility, and self-awareness. ・Self-regulation of learning. ・Promote links with other subjects and fields of knowledge.	・Having the willingness and initial attitude of the student. ・*"Here is one of the weaknesses that I see in this kind of project, that people are ready or not for this type intrinsic thinking and do it the way it is expected"* [Stu. 5]. ・Accompany the process of change. ・*"We are used to a given way of doing things, and change suddenly creates so much discomfort and that is a problem for the group as it affects the whole group"* [Stu. 6]. ・Stiff times. ・*"There is a problem of adapting with the times imposed by the Faculty, as this completely breaks the learning space, for me, in a very decisive a way"* [Stu. 6].
Attitudes and Roles	・The teacher goes from transmitting information to accompanying and encouraging students' learning processes. ・*"Everyone marks their own goal, the starting point and the point you want to get. I do not know to what extent propose assessments with a common objective will promote student learning, as everyone goes at their own pace"* [Est. 6]. ・Involves cognitive and emotional dimensions of students and teachers. ・Need/challenge of transforming the passive role of students into an active and participatory one.	・Difficulty by teachers and students to switch roles. ・*"I was struck as classmates lived with anxiety, disorientation, namely, they did not have a guide, had no tools, they were living with anguish"* [Stu. 6]. ・To think that there are things that cannot be learned. ・*"We start from the notion that creativity is innate and actually is an ability we have to develop"*]Stu. 3].

Technological Aspects	・Improving and developing information handling and digital competence. ・Use, explore, discover different digital applications. ・*"I used a different program, scrab video. For me it was new program, but I made the decision to leave moviemaker and learn to use this program for myself"* [Stu. 6].	・The lack of time. ・*"Time is important [...] new goals arise during the process... it is what caused me more motivation, but also makes that something can get out of hand ..."* [Stu. 1].
Influences emerged	・Share the process outside the University. ・*"We share it because we went to a conference in Valencia in June and will go to a conference in Helsinki"* [Stu. 6]. ・Create interest groups, which continue to work. ・*"My research group has continued meeting out of the class. Once a week or once every two weeks we meet just to discuss about the project, about something that has emerged, sometimes that has happened to us... that is, it has created a kind of link that to me does help me to continue …"* [Stu. 6]. ・Questioning as future teachers.	
Sustainability	・We are a propitious time to introduce innovative student-centred perspectives. ・*"I think we are in a very favourable moment ... very sweet to incorporate such philosophies. We are in a culture very much maker ... "do your things" personalize yourself...."* [Stu. 8]. ・It needs an accurate methodological and technological preparation for the teacher. ・Possible overwork and extra dedication to teaching.	・Need / difficult to implement it in the maximum number of subjects. ・*"You run the risk of falling into meaninglessness, if only it is implanted in a subject and does not have continuity"* [Stu. 5].
	・*"There is a problem, a problem of where is the limit. From do-it-yourself for the teacher wash their hand from teaching, to do it for yourself with twice the working load. Because it is not a common goal for all but, as it was in our case were fifty videos of people who have learned at a different rate, which has been involved in very different ways. For me it is a workload much larger and it requires more perseverance by the teacher"* [Stu. 6].	
Assessment	・Assessment of the process, not just of the result of learning. ・Self-assessment practices ・*"Ours was more a process of self-evaluation from concepts discussed in class and on which we work ... from philosophical references and you could even relate to video, literature, or whatever"* [Stu. 6] ・Possibility of setting the own learning goals. ・The challenge of turning a personal learning process into a numerical grade. ・*"I think the problem of DIY is the assessment, how is evaluated, since you cannot do it with a number, it is a personal process. No one can be compared to a number within a marked scale because it has no sense "*[Stu. 2].	・Difficulty of changing beliefs about the role of evaluation. ・*"In the rating system the most important thing is the learning process, but the current education systems emphasize success ... and success involves numerical grades, to get a ten, and this makes a series of values that hurt the same learning process"* [Stu. 1].

Other issues	• Risk that the University loses its role of intellectual reference. The challenge: to solidify and make explicit new forms of legitimizing knowledge. • *"A person who stands before a video can get up to 6,000 Euros per month. You have found the key to the prestige ... for me one of the dangers is to make sure that everything is valid and that there is nothing set ... The university is a place of mental content, theoretical content that we need and we need to learn"* [Stu. 5].	

As a final thought, we collect the contribution of a student of Primary Education degree, who sets out, thinking of his own professional future, that the key question, the fundamental challenge lies in the need for teachers to rethink their teaching identity, their understanding of their role in teaching and learning. He considers the importance of moving from the position of knowing everything, to the position of somebody ready to learn while teaching.

> *"The teacher has to have his pride, but he can swallow it at any given time. For example, if you know more about the this program ... video editing, and I know less, I can make you to explain it to the rest of the class ... and there is nothing wrong with that because you learn from all ... The only thing is that sometimes swallowing this pride it is not easy, especially in people who are deeply rooted to higher education* [Est. 7].

UNIVERSITY TEACHERS (ACADEMICS)		
Theme	**Strengths/Challenges**	**Weaknesses/Difficulties**

DIYLab activity	・Connect activities between three subjects. ・Generate topics from subject matter but guided by personal interest. ・Propose the selection of a group with specific learning needs for which to design a learning environment.・Focus more on learning experiences as a process than in outcomes. ・To promote authorship and collaborative work. ・Ensure consistency with the approach of the subject. ・Sharing the processes beyond the classroom. ・Promote maker and share culture. ・uccessful experience. ・Digital products reflected what was addressed in the subject. ・The DIY digital objects had an acceptably quality. ・Consistent and influential project. ・Motivating for students and teachers. ・The language of DIY digital objects connects more with other students than explanations of teachers. ・Delivery times have been met. ・Reaffirmation, deepening and development of various skills, including digital competence. ・Approaching students to theoretical issues. ・Promoting other ways of learning. ・Facilitates the teacher-student relationship.	・Difficulty in understanding the DIY philosophy for students and teachers.・Not having (teachers and students) a clear notion of where we were headed. ・The evaluation. ・The voluntariness or not voluntariness of some processes and results (especially regarding the decision of sharing or not the DIY digital objects). ・The utility for students・Fitting the project in the syllabus of the subject.・The fitting of a project between subjects.・Focus DIY digital objects only on the visual part. Other representation variants should be explored.・Not being applied in other areas. ・Difficulty for students to connect inside and outside experiences.
Attitudes and Roles	・The feeling of being lost, by the prominence given to the student, is not a weakness because you get to port successfully. ・The way to represent knowledge changes and DIYLab products connect more with students. ・The different forms of production are complementary.・Doubts and initial resistance evolved into the ultimate satisfaction. ・Satisfaction and positive experiences throughout the project. ・Allows teachers to continue learning.	

Technological Aspects	・Innovation must be permanent. ・The use of digital technologies is revealed as fundamental. ・The Moodle platform helped to order, facilitating the implementation of DIYLab. ・Being able to choose the technological tool, which they knew or they wanted to learn, has been a success.・New features in applications such as Globster are discovered. ・Students have great potential in the digital competence.・Some students have more digital competence than teachers. They know more digital applications. However, the current trend is that the digital divide does not increase.・Mutual and continued learning occurs between teachers and students ・Ethical questions about the use of resources were raised .	
Influences emerged	・Promotes student autonomy. ・It is motivating for students and teachers. ・Publically sharing students' productions resulted in their improvement. ・Allows taking into account the students' knowledge.・Allows the opening of the university abroad and raises the challenge of deepening and maintain it.	・The need to consider future tendencies.
Sustainability	・The philosophy of DIYLab can be applied in other subjects, once the project is complete, but presents significant challenges ・The need to strengthen the teaching teams to advance.・The need to addressing challenges by teachers as assessment and cognitive change. ・Possibility to go beyond the classroom. ・DIYLab connected with the notion of a competence-based university curriculum. ・Requires transversality. It is important not being an isolated experience.	・Pending topics in need of further analysis: ・How to assess.・Explore non-visual variants of DIY objects.・Broaden and complement perspectives. ・Increase the theoretical development.
Assessment	・The evaluation of the learning process reflected in DIY digital objects is an issue to be solved. ・Using shared with students rubrics ・Positive reaction of students to the evaluation. ・Difficulty of introducing DIYLabs in some subjects. ・The teacher needs to develop new skills to evaluate.	・Pending topics:・Focus on the process and not the product? ・Be based on certain characteristics of the digital object DIY can demonstrate student progress? ・Focusing on skills?

Participants in the discussion groups, like everyone involved in the project, valued very positively their participation in the DIYLab project and its contribution to the improvement of higher education. However, as noted in previous reports (D1.1, D2.2, D4.2), nor working conditions of university teachers -in this time many of them with part-time contracts), neither the traditional teaching culture -based on teachers' isolation, or the curriculum - with fragmented knowledge, times and spaces, promote learning philosophies such as DIY.

FINLAND:

Experiences of the interviewed persons are based on the activities, which have been described in detailed in report 4.3. The pupils' DIYLab products and digital objects can be seen in the shared ” Digital Hub” site of the project (http://hub.diylab.eu/).

In short: With the elementary school, 11 digital objects from the three themes have been uploaded in to Digital Hub network site. The upper school had seven themes and 42 products of the students are visible through Digital hub.

The focus groups were proceeded according to the themes which jointly agreed on, and which are based on earlier reports. The topics and themes were dealt according to the target group and only the points which are relevant of the target group were raised to a discussion. The interviews were conversational and the various themes rose fairly spontaneously out, because the themes were partly overlapping. The voice recording helped collecting and classifying the outcomes. (ANNEX1,The questions for focus groups)

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PRIMARY

DIYLab-Philosophy:

How would you compact the basic idea?

- *A textbook is not used and we can do something chosen by self*
- *A topic to be studied will be planned self from the beginning*
- *The DIYLab is fun*

What are positive matters or strengths?

- *It was nice and educational to do videos*
- *The own experimenting was nice*
- *It was easy to follow the plan, which you have made for yourself*
- *The freedom to choose what to do and what to study was great*
- *The information retrieval were nice*
- *It was nice to work differently.*
- *Group work and working together was nice and it went well*
- *It was allowed to use the imagination in the studying*

What are negative matters or weaknesses?

- *The making of the plan is difficult*
- *To start working was hard, if you did not know what to do*
- *It was difficult to decide the subject to be studied*
- *It was difficult to find information (from the library)*
- *The making of the videos is challenging for example editing and persuasion of the actors*
- *It was difficult to find the peaceful working space from the school*
- *English language first seemed difficult*

How your ideas of the DIYLab have changed during the work?

- *Working with the same subject long and the same group began to irritate*
- *At the beginning It was difficult to find work and roles but later it went well and working together was easy*
- *After the starting difficulties, working was nice*
- *The plan have to be good, so that all can follow it*

Action:

What did you do in a different way, than usually in the school?

- *Using English in that way was new*
- *Long project from the same matter was new*
- *Sharing the outputs to Internet and to the international audience was new*
- *The information technology was used as help in a different way from before*

What information technology skills you used and/or learn?

- *We made longer animations and videos than before*
- *A lot of information retrieval from the net and library was used*
- *New applications (iStopMovie Prezi) that were rehearsed before were used as a tool*
- *The video editing was new*

Did you utilise something that you have learned elsewhere earlier or did you use DIYLab skills somewhere else?

- *iMoviesta has been useful outside the school*
- *One pupil has made the YouTube videos as a hobby, and he also did the video edits the for the DIYLab presentations*
- *The making of the videos and presentation apps have been used in other subjects*
- *The hobby of the English language helped and it can be utilised also outside the school*

The future:

How would you see the future of DIYLab at your school?

- *Except for one pupil, all the interviewees wanted to have more this kind of action but the small improvements are needed both a teacher and in own operation*
- *Teacher should allow pupils to decide the group, but otherwise OK*
- *The following outcomes and presentations would become better surely and in the project of the history in this spring, the presentation indeed was better*
- *.*

PRIMARY: Teachers

DIYLab-Philosophy:

How would you compact the basic idea?

- *A multidisciplinary self-directing learning rises into pedagogical center*
- *The pupils are given the opportunity to search for information about the subject and a task to think what they already know, how to collect more information and what the new matter represents to others*
- *DIYLab actualization means cooperation between the subjects and the teachers*
- *DIYLab is a constant way to work*
- *DIYLab is a way to carry out multidisciplinary learning ensemble or the phenomenon-learning which are mentioned in the new curriculum*
- *In the pupil's action it is important, how to make the own ideas and thoughts into the activity and operation. Also that has been mentioned in the curriculum.*

What are positive matters or strengths?

- *The pupil's genuine freedom of choice has surprised both the pupils and the teachers positively*
- *The learning of social skills and its effect on the class are challenging but developing for the pupils. (This "result " is often more important than content related learning outcomes.)*
- *The learning and utilizing of the information retrieval are important to the pupils*
- *The working method develops flexibility of the class and the pupils to the different approaches*
- *The teacher's new role and the most important tasks clarify when experimenting*

What are negative matters or weaknesses?

- *The project cannot be loose from the curriculum in any school subject which is involved to the activity*
- *The shared planning of the operation takes much time*
- *The realization disturbs the timetables and also affects to other groups, teachers, teacher trainees and use of premises*
- *For some parents, increased use of the information technology at school, does not always represent the image of the proper school work*
- *The pupils' freedom of choice can lead to the unwanted mechanistic working. The teacher's responsibility indeed is to guide students to do things which supports the deeper thinking and the learning*
- *To a restless pupil who has challenges in social skills, the DIYLab work is too demanding.*

How your ideas of the DIYLab have changed during the work?

- The experiment brought more realism and skills to the teacher to the approaches of the new curriculum.
- The pupils' motivation, enthusiasm and focus to the work " surprised "
- The language awareness in new working methods went forward. Now I have more concrete concepts. It is important to name and to collect the concepts, that it is possible to discuss what approach is used and what working method is suitable.
- DIYLab is not a solution to all teaching, for example the basic use of applications and approaches (a concept map, information retrieval) must be practised earlier and separately. If there are shortcomings in the studying skills, the DIYLab will be too demanding and/or slow.
- With experiences, it is now easier, to courageously join the cooperation with other teachers.
- The DIYLab working requires different physical premises than class teaching, so that the groups can work independently in a peaceful state (better)

Action:

What did you do in a different way, than usually in the school?

- We tried seriously to give the responsibility to the pupils, instead of "fake freedom". It was hard but our nerves weren't frayed.

- The TVT applications were used as a tool, not only for a drills
- The information retrieval became part of the learning practise
- The English language was used creatively and to the right need

What information technology skills you used and/or teach/learn?

- *The use of the video in this scale for pupils' presentations was new*
- *The pupils independently extended the use of applications that have been learned earlier, for example adding video to PowerPoint slides and adding subtitles in to iMovie videos*
- *The Prezi presentations were made for the first time. They have been used continuously even though none of the Prezi-presentations ended up to the Digital Hub*
- *Students use their smart phones independently, particularly for the communication of the team. Also a sick pupil at home participated in the working.*
- *During the DIYLab project, school has got more new devices (iPad) . Both the pupils' and the teachers' know-how has developed.*
- *Sharing the presentations via Internet to the international audience motivate pupils and it was inspiring to be a part of the activity, which is shared with the schools of other countries.*

How did you succeed with the cooperation with the school, parents and the rest of surrounding society?

- *The library was a familiar school partner in cooperation before but now it was utilized a lot*
- *All staff of the school supported the pupils' action (outside the class) well*
- *Getting the parents in to action was too challenging in the first pilot. The teacher's time and energy went to matters inside the class.*
- *In the initial plans, getting the parents in to action was too idealistic. The time and space restrictions are big and even if parents are interested in the child's school work, it is difficult to motivate parents to work*
- *For the parents with an immigrant background, new way of teaching and learning may seem strange, "too free" and even negative.*
- *It is important to provide Information for the parents about Finnish school life, such as about short school days and amount of the homework…*
-

The future:

How would you see the future of DIYLab at your school?

- The operation is continued. The DIYLab pilot was a valuable experience
- With the introduction of the new curriculum the operation continues and develops.
- The role of parents and their knowledge about the new approaches of the school are developed so that the parents could participate for example in the information retrieval with the pupil. Working as a guide and partner, but also being at the same time student himself.

PRIMARY: Family members

DIYLab-Philosophy:

How would you compact the basic idea?

- *The information technology is used widely and it is a natural in the studying*
- *DIYLab was an exercise for the introduction of the new curriculum*

What are positive matters or strengths?

- This kind of working has been brilliant. The best memory from the own school days is related to project work of the upper school.
- The working life requires project work and teamwork nowadays so it is good to practice it already in an elementary school and even earlier.
- The guidance given by the teacher at the beginning of the work will be a good matter. Then the children will refine the ideas for themselves
-
- The teacher's enthusiasm to the topic directs the pupils' motivation to those matters which must be learned. Still the children feel that they have influenced their studying.

What are negative matters or weaknesses?

- *There must not be too much freedom, to maintain the focus at school work*
- *Too demanding tasks can depress and frustrate if the pupil can not complete nothing*
- *The danger is that the strong agent of the class are able to determine too much*
- *The forming of groups can be too challenging to the pupils*
- *Nobody must not be left outside the groups and operation. Everybody must be allowed to participate in the doing*
-

How your ideas of the DIYLab have changed during the work?

- *The pupil has said quite little about the work of DIYLab, but it can be kept as the positive message.*

Action:

What has done in a different way, than usually in the school?

- *The project work is familiar already earlier, but extensive use of the information technology brought new dimensions to work.*

The future:

How would you see the future of DIYLab at your child's school?

- *Hopefully more this kind of action will come. Fortunately the new curriculum helps in that direction*
- *This kind of operation should be begun already beginning from 1st class*
- *The younger sibling who is only in the nursery school, wanted to be a part of the project, because he makes the Lego videos at home. This tells something of the need of change in the traditional school.*
- *There have been fine nature projects and yard projects in the preschool. I hope that these activities does not end at school.*
- *Even the small projects which are DIY Lab type, motivate the pupil and at the same time a skill to design and to make bigger projects develops.*
- *Hopefully more DIYLab "real life-projects" are coming.*
- *The same project could be under work several years. Pupils should have a possibility to return to the subject more profoundly later.*

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SECONDARY

SECONDARY: Students

DIYLab-Philosophy:

How would you compact the basic idea?

- *The teacher said that DIYLab is a project in which we search and learn the information ourselves. – It was like that.*
- *The teacher wished, among other wishes, that we should form groups of 2-3 persons, but the decision was on us.*

What are positive matters or strengths?

- *The way to present the project was free, which was motivating*
- *The use of the computers and devices was nice*
- *The own planning was quite difficult but however, it succeeded OK*.

What are negative matters or weaknesses?

- *In the groups there were small person problems sometimes*
- *The planning based sometimes on improvisation, but somehow it seemed to work*
- *It is difficult to make the schedules keep*

How your ideas of the DIYLab have changed during the work?

- *The working went better than expected, even though sometimes it almost turned to the playing*

Action:

What did you do in a different way, than usually in the school?

- *The new computer programs were used. For example Kahoot was chosen as a manner of representation by us.*
- *The old mechanical planet thing tellurium was new for us. It was used on a video.*
- *We searched and did use internet videos as an information source*
- *One video was made about the measurement of speed of the light. Pupils of the 8th grade did the experiment in the university and we did the video*

What information technology skills you used and/or learn?

- *Kahoot application was new to us*
- *We made lots of videos with Gopro-camera and we also edited them.*

Did you utilise something that you have learned elsewhere earlier or did you use DIYLab skills somewhere else?

- *The editing of videos was familiar of the own hobbies*
- *The making of the videos was practiced earlier separately at school, just for the project*
- *One pupil has a YouTube channel which helped the project. Afterwards the project affected his YouTube hobby too.*

The use of the computer is a part of normal life outside the school and there was an advantage from i

The future:

How would you see the future of DIYLab at your school?

- *Hopefully more similar projects will come but not all the time*
- *Shorter projects would be nice and easier to implement, e.g. 1 day a couple of times in semester.*

The project is a good way to learn both contents and working, for example information retrieval and the use of the library.

SECONDARY: Teachers

DIYLab-Philosophy:

How would you compact the basic idea?

- *DIYLab is long lasting teaching cooperation between the teachers*
- *Transfer of the responsibility to the pupil*

What are positive matters or strengths?

- *The pupils got excited, took the responsibility and found rational work themselves*
- *There was more time for the teamwork than in the traditional teaching*
- *Pupils got their job done*
- *The own choices were allowed, for example "the weakest pupil of the class" got excited, got material from the library himself and made his presentation, and the best pupil of the class did alone an extremely good presentation, according to his choice*
- *DIYLab compels* the teacher to examine the curriculum more widely than just for his own subject

What are negative matters or weaknesses?

- *It is difficult to find time from the timetable to the working, but it was possible to prolong the last lesson of the afternoon a little after school*
- *It is important, but difficult, to find shared planning among the teachers*
- *The use of the new and different working method caused a substitute problems in a case of the teacher's sick leave*
- *Pupil safety the working/the supervision, for example in the chemistry etc., will be a challenge if the pupils break up to different work premises*
- *A part of the learning is based to the previous knowledge and learning, for example in the physics and the teacher have to prevent a pupil from* making false conclusions in his independent work.

How your ideas of the DIYLab have changed during the work?

- *The confidence towards the pupils increased*
- *The courage to change own plans increased*
- *The anticipated differentiation was taken care ” nearly automatically" both for the advanced pupils and for the slower ones ”*
- *DIYLab brought* realism to the texts of the new curriculum

Action:

What did you do in a different way, than usually in the school?

- *Co-working with another teacher it was different than before*
- *As a teacher, one had to take care of wider contents and organizing than normally.*
- *The cooperation with the physics department of the university was a new and positive experience*

What information technology skills you used and/or learn?

- *The information technology was used widely and from many sides*
- *The iPads, PCs and the pupils' own smartphones were in use*
- *The pupils searched and used the (phone) applications independently*
- *The pupils advised the others in the use of ICT*
- *Pupils who speak Finnish as a second language, were allowed to use their mother tongue in the Internet presentation. The pupils were proud of this.*

How did you succeed with the cooperation with the school, parents and the rest of surrounding society?

- *The parents were not really involved to the work*
- *The library and the university were used in cooperation*
- *The pupils went outside the school (to a shop etc.) to film and interview people for the projects*

The future:

How would you see the future of DIYLab at your school?

- *The operation will continue and in the future a short "DIYLab practice will be arranged for the teacher trainees ".*
- *New teachers and new school subjects (mathematics) are going to try DIYLab method and there already are a few plans for the extension.*
- *Evaluation also is developed for the new curriculum and DIYLab will be connected to that e.g. as an example of the peer review.*

SECONDARY: Family members

DIYLab-Philosophy:

How would you compact the basic idea?

- *DIYLab is the giving of the responsibility to the pupils and learning to learn*

What are positive matters or strengths?

- *DIYLab work intensifies pupil's learning and understanding*
- *It is good for the connecting of school subjects in the natural way*
- *The self-directing work can be made for instance on the way or on holiday*
- *DIYLab work motivates in subjects (a religion, history), which pupil feels uninteresting*
- *Working as a part of the group teaches social skills*
- *The own smart phone can be used to record material on a trip etc.*
- *New PowerPoint skills have been used at home*

What are negative matters or weaknesses?

- *Learning of too big projects do not succeed*
- *Will the inequality increase in the class in the learning*
- *The teacher's role and control is important. The friends do not always give the right model.*
- *The teacher must provide the support to the ones which need it*

How your ideas of the DIYLab have changed during the work?

- *The children have said nothing about the DIYLab work*
- *The social tools and communication can be used for school matters*

Action:

What has done in a different way, than usually in the school?

- *A lot of information technology was used. – It would indeed be quite strange if a modern school were not using it.*

The future:

How would you see the future of DIYLab at your child's school?

- *Good activity it but requires good planning and tools*
- *The modern and active (ICT) environment enables DIYLab learning and concentrating on learning and pupils.*
- *At dream school would be a lot DIYLab activity*
- *Individual learning would be desirable and even the personal curriculum.*
- *More freedom to the content and use of time is needed*

CZECH:

All the results are reflected by the legal representatives, teachers and pupils. The below presented findings are structured by topics or areas that will lead the discussions.

DIYLab (activities implemented)

One of the main principal ideas of DIY Lab at this elementary school was to connect the first and second grade elementary school, respectively second grade pupils in their activities or based on the outputs of these activities taught students of first grade. Most of the work and activities took place at school, but some of the projects also required preparation outside elementary school, for example Prague Zoo, Stromovka park and others. Activities varied not only in their output and forms of processing but also in duration. For example, for almost half a year the pupils were preparing the project about the personality of Václav Havel. Legal representatives see great benefit in that pupils systematically worked at home on a specific task. On the other hand, teachers and pupils are of the opinion that most of the activities took place in the course of teaching, most have been mentioning art lessons, information and communication technologies. Pupils also mentioned the Czech language and math lessons. Teachers tried to tie the activities as closely as possible to school's education program and promote interdisciplinary relations.

Behaviours and roles

Among the activities were included individual and collective work; these aspects differed in the activity and the actual output of the activity. It cannot be determined whether individual or collective activities were predominant due to the ways in which the activities were submitted and processed. Most activities had incorporated in them at least minimally both individual work and cooperation between pupils. Most of the students agreed that the work in groups was rewarding and that they were able to divide the work and to worked together. Three pupils have expressed that the group work was not suitable for them in terms of completion of the project which involved only some of the students, not the entire group. Parents on the other hand stated that they observed responsibility of individuals for the whole group.

Passing the knowledge to pupils from the second grade to the first grade changed the thinking of pupils of the 2nd grade and their attitudes towards younger classmates. Pupils got into the role of teachers and tried what it's like on the other side, rather than from the desk. This aspect was the most important in terms of the activities for students, legal representatives and teachers in terms of behavior and roles.

Teachers consider as one of the major benefits the transformation of materials for the needs of younger pupils. Another aspect they reflect is the growth of social aspects and tightening the bond between the older students and the younger ones.

Technological aspects

All three surveyed groups commented on the technological aspects and thus to what digital technology the students most often chose, or which the teachers had to work with. List of most often mentioned software and hardware and the type of activity is described below.

PRIMARY AND SECONDARY

STUDENTS PRIMARY / SECONDARY (Pupils' view):

- work with the camera - problems with printing photos
- search on websites
- scanning images
- extended work with a text editor
- creating a presentation for IWB
- work with a feedback equipment for IWB
- applications for video editing

- work with mobile devices

TEACHERS PRIMARY / SECONDARY (Teachers' view):

- work with mobile technologies (tablet, mobile phone)
- work with a camera
- preparing presentations, not only in presentation editors, but also to convey to the IWB by specific software (SMART Board, SMART Notebook)
- work with a text editor
- work with a feedback equipment for IWB (SMART RESPOND)
- work with photos
- search for information sources

FAMILY MEMBERS PRIMARY / SECONDARY (Parents' view):

- work with office applications (spreadsheet)
- work with graphics applications
- work with a camera
- Sometimes the IT involvement was non-existent or not recognised by a legal representative

Due to the diversity of activities which took place in the elementary school within the project DIY, we can not rightly decide whether the increase digital literacy occurred among pupils, respectively among participating teachers. However, the outputs from the project suggest significant involvement of digital equipment, especially for video and audio processing. It is evident that there was an involvement of software equipment. The pupils themselves do not find a significant shift in working with digital technologies. From this perspective, it can be said that the DIY activities did not contribute to the development of pupils' digital literacy.

Influences arisen

Cooperation between the elementary school and CUNI took place through technological support of documentation and processing of individual activities, while representatives of the University acted in the role of methodical assistance and the implementation of DIY ideas, but only at the beginning. Deeper cooperation dealing particularly with the coordination of activities carried out with the school management, respectively with the principal, who was the coordinator of the project.

As part of a focus group with teachers, it was found that the teachers themselves appreciated the training dealing with digital technologies and implementing digital technology in education. Teachers also complained about the need for a "culture of working with technology" in terms of the habit of working with technology for work, not for play.

Cooperation with other institutions, individual persons and premises took place according to specific activities and can not be generalized. Compared to regular classes the DIY activities did not make them too different in this aspect.

Sustainability of the DIYLab project

Except for the ninth grade, which in its end a nine-year schooling cannot imagine the continuation of the project, all pupil participants of FG can imagine the continuation of the DIY project in the upcoming school year 2016/2017. Teachers and legal representatives have stated that they would welcome a similar form of activity. At the same time they emphasized the possibility of deeper cooperation of pupils in assigning of any activity. The actual management of the school confirmed that the DIY philosophy will be promoted in the school year 2016/2017 and there will be given much more space for pupils to initiate their projects and how they are processed.

4 students expressed that they would have found it interesting to work that way in a particular subject on topics that they are not familiar with. This alternative would have been more difficult than to work with easier topics, on the other hand the concept is attractive.

Assessment

Pupils, parents and teachers talked positively about the involvement of DIY philosophy and processed activities in the project. As great benefits they consider involvement of the school as a whole and especially the cooperation between the first and second grades. The students and legal representatives talked in the sense that if other activities within the DIY philosophy were to follow, there should be put more emphasis on self-inventing specific activities by pupils and emphasized that they would welcome more involvement of digital technology in an autonomous way.

All teachers and students agree that the DIY activities were managed to be finalized. Four students mentioned they would like, in addition to information on the website itself and the presentation before the HUB, to present to legal representatives, respectively the wider community.

The responses of all participants of FG showed that there was a lack of in-depth analysis and presentation of outcomes of the activities. The principal of the school confirmed that this phase is still too failed due to the time constraints, however, it is taken into account.

In the overall assessment of the project itself and the DIY philosophy, parents were pleased with the course and results of the project itself, they emphasized the possibility of students to test themselves in another way of education by training others, and distancing themselves from passive learning to active creation of information and solutions to problems within specific activities. Parents even praised the work of teachers and their active involvement in the project.

Pupils commented positively on cooperation with teachers and general DIY activities evaluated as "edutainment". On the other hand, they expressed also in the way that work was fragmented to specific classes and they would appreciate more continuity in activities. Organizational constraints of time were labelled by teachers as well as one of the biggest challenges and obstacles for activities of this type.

Some teachers also pointed out that if the student is asked to monitor the activity, it lessens his experience of the activity itself. Teachers also noted that what the students were doing will be much appreciated later.

CZECH UNIVERISTY

Results

DIYLab (activities implemented)

Majority of DYILab activities for ICT student teachers who studies at the Faculty of Education were included into compulsory one-semester courses focused on digital technology/ informatics/ computer science and pedagogy of ICT dedicated to teaching approaches how to develop digital literacy. Some part-time student teachers who work in primary or secondary schools as nonqualified ICT teachers incorporated the DIYLab philosophy into their teaching with pupils in primary or secondary schools; they could see if and how DIYLab philosophy can be available for school education, too.

The DIYLab activities were parts of students' assessment. The DIYLab activities were given to student teachers as a seminar assignment with the aim to get credits. Student teachers had to find a solution, to cross the bridge when they come to it. Sometimes student teachers felt a need their teachers could help and support them or sometimes some rolling meetings were missing.

Behaviours and roles

In comparison with regular up to now teaching student teachers within DIYLab activities recorded a process of their work, they tried to propose another way how to solve the task with thought on their university schoolfellows and colleagues that their outcomes would be useful and suitable also for them.

Some student teachers teams did not miss teacher's support in DIYLab activities, on the contrary, they preferred to learn to solve a task themselves; the most important contribution for them was one can learn him/herself - if you can learn problems without any help you can learn very much and understand problems better because you think about it.

For collaboration in team work[1] members of teams analyzed the whole procedure what to do to solve the activity, they discussed not only when they met together on seminars, but also out of school through the internet (Skype, chat, discussion forum, mobiles, etc.). Majority of student teachers worked on DILab activities out of the Faculty of Education - at home, at their schools, outside (on streets, transport, in libraries, …).

Student teachers worked individually, or in tandems or in a big group (for example when they developed a wiki as an encyclopaedia of pedagogical concept). The intensity of collaboration was more significant in DIYLab activities than in another assignment solved at the Faculty of Education. Some student teachers were looking forward to collaboration with other schoolmates, but at last the solved could be realised individually or in tandem.

Technological aspects

Within making plans for DIYLab right from the start we worked on the assumption student teachers will use free available SW and HW or their own devices (BYOD). In case that somebody did not know which application to use s/he could have ask for the schoolmate's advice - student teachers collaborated, discussed and shared their experiences and they were able to give her/him advice on such problem.

If it was necessary we organised a particular seminar in which students were introduced how to use an appropriate application (for example a seminar how to create animations with WeVideo). Some students did their DIYLab activities individually, therefore sometimes happened they had to learn themselves how to use some technology to be able to accomplish their DIYLab task. "Thanks to the DIYLab activity which I was participated in I could master myself doing digital animations."

Influences arisen

In DIYLab we exploited very much the ideas proposed by the Dept. of Biology and Environmental Studies which has brought a lot of problems from biology to be solved using digital technology. Unfortunately the schedule of the courses of biology did not correlate with the schedule of IT courses therefore from

[1] In many cases student teachers, especially part-time students, worked in tandem.

organisational point of view we could not realise such inter-disciplinary collaboration. Nevertheless, we could notice a great influence of the Dept. of Art Education on some DIYLab activities (for example in a project “How I am becoming a tecaher”) especially in methodologic instructions how to record a way of thinking and learning (by story-telling, scenarios, mindmaps, etc.).

Student teachers who did the activity “How I am becoming a teacher” were very motivated to finish in a high degree of quality their outcomes because authors of two the best results could visit Detroit city for several days to present their projects to the American students.

Sustainability of the DIYLab project

At the Faculty of Education we will continue in implementation of DIY ideas and philosophy in all levels of teacher education:

- On the Bachelor degree study level as a project approach how to apply digital technology in practice to solve different types of problems with the emphasis of multi-disciplinar relations and as a way how to develop digital literacy and computational thinking.
- On the Master degree study level as a pedagogical approach how to teach to develop digital literacy and computational thinking.

There are no barriers to continue. Nevertheless, we would like to give a greater attention to develop deeper collaboration in this idea with another departments of the Faculty and to concentrate on how to motivate student teachers to be more active and to share these after-school experiences and expertise with the aim to join them with their university studies.

Assessment

The DIYLab activities had to be a part of students’ assessment. In WP02 we did not establish any general framework for students’ works assessment. We did not know what would be happen and if student would be successful in DIYLab activities. Therefore we decided to assess each single activity independently. The assessment were done by the teacher, or in case of an interdisciplinary cooperation from more teachers (for example in a project “How I am becoming a teacher” in collaboration with Dept. of Art Education). In some cases the assessment came from the side of the students themselves.

When the DIYLab activities were over some students start to revise and re-evaluate their own DIY outcomes (doing a critical self-reflection), especially when they familiarised examples designed by Spanish and Finnish students published on DIYLab HUB. Making comparison their outcomes with outcomes of their colleagues from Spain and Finland stimulated students to think critically about what they did in DIYLab activity, how they could change or modify their procedure and outcomes.

Focus groups demonstrated how important was to organise focus groups in which student teachers could summarize their experiences and opinions. The focus groups were a great opportunity to evaluate the DIYLab philosophy in a context of teacher education. These guided discussions contributed also to better understanding what student teachers were expected to do and what they in reality did.

Others

In the context of the Czech reality the DIYLab project pointed again how it is important student teachers must dedicate attention to development of their foreign language competency, how is is important they do not avoid to chances to improve their ability to communicate in English. Some students became aware their handicap to communicate in English impeded them to articulate more understandably their DIYLab procedure and thinking; if they can use more advanced English they could publish the DIYLab outcome on the DIYLab HUB in a better shape.

Review:

Focus group meetings serve the purpose and lots of firsthand information about activities, attitudes and expectations can be read from the comments. Outcomes of the focus groups have been surprisingly similar when we compare the same level groups in different countries.

Challenges (Weaknesses/Difficulties) were much as anticipated before the actual DIYLab (school) activities, especially in scheduling. One challenge, what was not that much in discussions beforehand, was that students were “unwilling to mix school life and home time”. This correlated also to the aim of the family involvement.

Note, that because of many aspects, the universities are actually in their own category and comparison to lower level schools is more difficult. For instance students, teachers' roles and “school subjects” are very different. Still, comments related to pedagogical principles, atmosphere and attitudes are often parallel.

One big outcome was that, despite difficulties, all focus groups had very positive and forward looking attitude towards DIYLab. Much enthusiasm and development oriented attitude can be read from the comments.

2.2 Pedagogical, technological and organizational specifications of the implementation of DIYLabs, foreseen in report D2.1

SPAIN

Thanks to the analytical and reflective path followed during WP2, in report D2.1 we could draw pedagogical, technological and organizational specifications, which have been taken into account for the implementation of DIYLab in school (WP4, report D4.1). For this report, we have recovered an overview of those specifications, as shown in the table below, in order to relate them with the outcomes arisen from focus groups and, if necessary, modify them to write the next section about improvements for future implementations.

Specifications for forseen implementations in WP2		
Pedagogical	Technological	Organizational
Creating a meaningful learning for students	Accepting the important role of technologie,s although is not indispensable they are the center of activity	1 activity 3 months of DIYLab activity **(secondary)**
Fostering students' authorship	Knowing how to select, use and manage digital devices and its functionalities according with the needs.	1 activity 3 months of DIYLab activity 60 hours **(primary)**
To promote students' decision-making in a more creative way, going beyond the norms. Fostering appropriation, transforming, experimenting.	Using basic software for editing text, images, video, sound and multimedia presentations	Human sources: 3 people 2 classrooms (**primary)**
Fostering learning by doing	Doing activities in group using tools and virtual working environments (Hangout, Skype, Google Drive, smartphone apps, …)	Recursos humans: 3 persones / 2 grups-classe **(Primària)**
Contributing to the development of students' autonomy	Using tools and devices for virtual communications among students (Google Drive, intranet, smartphone apps, …)	
Contributing to the development of students' problem solving capacity by themselves	Creating digital publications	
Helping to discovering the advantages of self-learning	Searching, contrasting and selecting digital information among different sources and digital environments	

Using research as strategy	Building new knowledge through digital support applications and the processing of information.	
Working collaboratively	Organizing and using personal learning environments through digital media	
Using English as the language for communication	Using technological resources such as: tablets, laptops, interactive digital whiteboard.	
Working with curricula in a transdisciplinary way		
Working in groups based on students' interests		
It is required an initial focus upon which to work during the course. Starting the project with a common topic.		
Proposing engaging activities for students		
Teachers propose problematic situations that students have to solve through inquiry and experimentation		
Teacher accompany this process by guiding the students and proposing new challenges that help them to develop their activities		
Finally, students will chose the project basing it on their interests and following the phases learnt in Tivo Creativo: analyzing the challenge; generating ideas; assess this ideas **(primary)**		
Attaching importance to the processes of work, through documentation (using different techniques)		
Formalization of final product will be open and each group will base it on their interests and aims.		

Students will present their work to family members and guests, sharing their conclusions and showing the artifacts produced **(secondary)**		
Assessment will be based on pre-established rubrics		
Assessment will include both the process of work and the final object produced. That involves three phases: co-assessment (among classmates), self-assessment and students' assessment by teacher.		

SPAIN UNIVERSITY

From the analytical and reflective path followed in WP2 we can draw the pedagogical, technological and organizational specifications taken into account for the implementation of DIYLab in the University of Barcelona (WP2, D2.2). For this report, we have recovered an overview of those specifications, as shown in the table below, in order to relate them with the outcomes arisen from focus groups and, if necessary, modify them to write the next section about improve¬ments for future implementations (table 6).

Specifications for foreseeing implementation in D2.2	
Pedagogical	
DIY philosophy	・Maker ・Self-run ・Not school-centred ・Not regulated by the institutions ・Anarchic ・It goes beyond the simple fact of sharing hobbies. ・It comes from youth culture ・Based on the interests of the learners ・With the desire to share

The DIY philosophy in relation to formal education	・Creativity: What do we understand by creativity? Transformation, appropriation, authorship, etc. ・Collaboration: DIY together. ・Self-regulation: it seems to be the less worked feature in the university, since the university system does not usually consider it. It is linked to problems related to the fragmentation of the syllabi and evaluation/ self-evaluation. ・Technology: intensive use of technology, which must not only consider digital technologies, but also analogical, artefactual and symbolic ones. ・Explain and share: interest in explaining to others what I know and sharing it.
The tension between suggestion and interest	・Is it possible to start from the interest of the students when undertaking a project in the classroom? ・Teachers thinking of themselves as creators of circumstances. ・Boosting the trust between student and teacher to back the project: trust – motivation – involvement – choice – motivation. ・Connecting the inside and outside of the university. ・Favouring interrelations between: ・Limits / freedom / uncertainty ・Having / wanting, understanding by having what I already know; and by wanting what makes it possible for me to learn what I don't know.
DIY philosophy in university learning	・Sharing. ・Forming part of a horizontal learning community, ・Questioning the idea of expert and tending towards doing it for oneself (with others). ・Critical capacity: questioning the syllabi, including my questions in them, etc. ・Authorising oneself within the discourse: from considering oneself not being an expert, from the need to learn. ・Deconstructing the power that decides what has to be studied.
Technological	

Digital tools	Consideration of existing and ongoing applications. For example: a) photography and video resources (Stop Motion, Time Lapse, Machinima, Animació 2D, Art 2D, Animació and Art 3D); b) audio and music resources (produc¬tion of podcasts, musical production); c) software and video games (Minecraft, Kerbal Space Program, Portal 2, Stencyl and GDevelop, Scratch); d) web production and digi¬tal art (Processing, Webmaker, WordPress).
Organizational	
Timing	(1) from February to July 2015 (2) from September 2015 to January 2016
Contexts and participants	・4 degrees ・11 subjects ・21 teachers ・265 students
Location	・Classrooms with computers ・Regular, ordinary, traditional classrooms ・Teachers' offices ・Virtual Campus
Main strategy	・There will be an introduction to the project at the beginning of the subject. ・It will be pointed out that they are collaborating on a European project of in¬novation. ・They will be given recognition for their collaboration. ・The importance of visually documenting their processes will be emphasised. ・It will be proposed that they link it to one of the research-based projects done in the different subjects. ・The importance of feedback and accompaniment by the teacher will be stres¬sed. ・It will be clarified that the intellectual property belongs to the authors and an ethical agreement will be established. ・The criteria of evaluation will be shared.

Characteristics of the DIY digital objects to be included in the DIYLabHub	・Last for a maximum of five minutes. ・Their content has to be comprehensible for a person not connected with the project. ・Have a visual component. ・Move between the descriptive and the reflective. ・Have a story board as a base. ・The title and author or authors are specified. ・Have a summary. ・Be subtitled in English.

FINLAND

This chapter includes both primary and secondary school level, taking into account the three specifications: pedagogical, technological and organizational specs. In many cases it is difficult to categorize activity or outcome into only one of these categories, because they are connected to each other. However, it is easy to notice all three dimensions in the following categorization.

The wider pedagogic principles of DIYLab activities have been described in report 2.3 (Work package 2). They have also been collected compactly in the seminar poster (presented 30.10 2015) as follows:

Teacher: *New roles as a guide, a supporter and a spurrer. Combining of the (new) curriculum with the new actions.*

Pupil: *Self-direction, digital competence, collaborative learning, crossing of the school disciplines, inquiry learning and as the highest objective, skills of the lifelong learning and new society skills*.

An important element which especially supported the DIYLab project was a start of the curriculum reform, which was seen as help in this project.

Finland's new curriculum, which will be on use 2016, is well in line with the pedagogic principles of DIYLab. On the other hand, the local curriculum work took the teachers' resources and time from all other project activities.

The above mentioned fairly abstract pedagogic objectives compress more in the planning of projects by the teachers to the two questions: ” Where am I good? What do I already know about the subject.”. Teachers propose a motto: "DIYLab helps pupils to learn things by themselves."

Before the beginning of the actual DIYLab operation the teachers and headmasters expressed their worry and their doubt, in the early planning phases, from the following challenges:

- The strict frames of the schedules

- The restrictions of the divided school subjects in DIYLab projects (especially in the upper school).

- Teacher's control of the (big) class. Big amount of work for organizing

- Giving up earlier teaching culture

- Activation of parents, getting them genuinely in to the activity

The interviews in the chapter 2.1.2, show that the operation of schools went as planned and the main objects were reached. At the pilot stage the collecting of experiences and learning from the process will be a central value and the interviews show that all the target groups have changed their attitude and their thinking as a result of the DIYLab experiment. In the comments concerning especially the future, the positivism, willingness to develop are reflected. The pilot experience taught concrete developing readiness.

DIYLab-toiminta oli kuitenkin osa koulutyötä ja oppilaiden kokemus kuvastaa ehkä aidoimmin sitä konkretiaa ja tasoa mihin DIYLab-pilotissa päästiin. Suuri osa haastateltujen opettajien ja vanhempien kommenteista sisältää kannanoton myös suunnitelmiin ja tavoitteisiin sekä niiden toteutumiseen. Toiminnan sisältö ja merkitys hahmottuvat niiden välityksellä selkeästi, eikä erillistä luokittelua ole tarpeen tehdä.

Seuraavassa taulukossa on luokiteltu esimerkinomaisesti muutamia oppilaiden kommentteja, jotka kuvastavat toiminnalle asetettuja määrittelyjä ja tavoitteita toiminnan tasolla.

The pupils' comments on the DIYLab operation classified to the objective definitions:

Teacher's new role: (From the students' perspective)	• *A textbook is not used and we can do something chosen by self* • *It was nice to work differently* • *The teacher wished, among other wishes, that we should form groups of 2-3 persons, but the decision was on us*
Student's self-direction:	• *It was easy to follow the plan, which you have made for yourself* • *The teacher said that DIYLab is a project in which we search and learn the information ourselves. – It was like that.* • *The own planning was quite difficult but however, it succeeded OK*
Student's digital competence:	• *Kahoot application was new to us* • *We made lots of videos with Gopro-camera and we also edited them*
Student's collaborative learning:	• *Group work and working together was nice and it went well* • *At the beginning It was difficult to find work and roles but later it went well and working together was easy*
Student's inquiry learning:	• *Long project from the same matter was new* • *A lot of information retrieval from the net and library was used* • *We searched and did use internet videos as an information source*
Cross-subject learning:	• *The making of the videos and presentation apps have been used in other subjects* • *English language first seemed difficult* • *One video was made about the measurement of speed of the light. Pupils of the 8th grade did the experiment in the university and we did the video*
Relationship to the curriculum and action:	• *The following outcomes and presentations would become better surely and in the project of the history in this spring, the presentation indeed was better*

The technological and organisational dimension of the DIYLAb actions are explicitly mentioned in the interviews. In the descriptions of the action and often also in the challenges and wishes for better (organizational and ICT) environment.

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CZECH

Teaching and organizational specifics

When specifying DIYLab at ZŠ Korunovační (see WP2), it was mainly based on the following basic principles that should be the same for all DIY activities and which thus determine the overall character of DIYLab at this school. These characteristics were based on both the major 6 DIY pedagogical principles set out in the project, as well as from the concept of SEP and teaching at the school.

1. self-production
2. information sharing
3. self-organization
4. testing effect
5. a teacher role: planning
6. implementation of new methods of learning
7. creation of products for practice
8. a new framework for project days
9. parental involvement

The concept of DIYLab at the ZŠ Korunovační fulfilled most of these points very well, but for some it completely failed and the question is whether they are appropriately selected and DIYLab in their context was poorly grasped. The following section summarizes the most important of these principles and their level of fulfillment or grasp in the pilot verification of DIYLab. These principles reflect pedagogical and organizational specifics of DIYLab.

Self-production of products for practice (1, 7)

Virtually all activities of pupils led to the creation of products that are subsequently use for education of pupils of lower grades (eg. theater for preschool class, mathematical problems for the first grade, Marketplace for the development of mathematical and financial literacy) or of the pupils themselves (eg. herbarium, mind maps, Ethology of mammals). All of these products were created by pupils themselves, and most of the products were of a material nature. This concept works together with the usefulness of outputs was appreciated by both teachers and pupils, for whom it had not only the motivational effect.

Self-organization and a teacher role (3, 5)

On the first grade the self-organization of activities is naturally very problematic due to the pupils' age. However, even there was at least some fulfillment of this aspect, although it was rather a sub-activity within the already prepared draft of the processing of activities and the organizational framework of education.

At the second grade, the rate of autonomous learning and self-organization of work was much more noticeable. Teachers see in this respect potential problems in excessively relaxed pace of individual pupils and difficulties in connection with other teaching and educational themes. Teachers themselves largely fulfill an advisory role and main coordinators of the activities of students in terms of synchronizing the pace of all students / groups and meeting deadlines. On the contrary, pupils sometimes felt too bound by instructions or procedures and how and when to do given activities (eg. Ethology of mammals), which for them was sometimes very discouraging, as was confirmed also in the focus group. Concept of the role of the teacher as a 'scheduler' proved to be too binging for pupils, especially in relation to the choice of topics and planning of doing activities. Each DIY activity was in fact designed by teachers beforehand, in most cases including the specific topic for processing.

A new framework for project days and implementation of new methods of learning (8, 6)

Activities took place mostly during lessons, sporadically during the project days or walks and excursions. The lesson at elementary school in the Czech Republic is by default 45min, which was also the case of ZŠ Korunovační. This unfortunately resulted in DIY activities to be very fragmented and the impossibility of choice of more flexible forms of organization. Although the original specification (see WP2) allowed for a greater deployment of project days for DIY activities, it was unsuccessful to fulfill this aspect, which both the teachers and the school management consider an essential condition for successful integration of the DIY philosophy into teaching. In terms of new teaching methods from teachers the project did not bring any new significant change. However, it provided better conditions for the implementation of new teaching methods

and approaches that teachers acquired during different training courses and outside the DIYLab project. Pilot deployment of DIYLab often gave new inspiration to teachers even from the environment of the school and their colleagues, because they had the opportunity to observe the activities of their colleagues and the outputs and processes in their DIY activities.

Technological aspects

The technological structure, which ZŠ Korunovační disposes, has been used appropriately in the pilot stage of DIYLab. From the hardware resources, in addition to commonly used technologies and devices like computer, wifi etc., there were used mainly tablets, interactive whiteboards and digital cameras. DIYLab at ZŠ Korunovační expected use of a variety of free software available (see report *D2.4*), but in the end it was hardly ever used. In this respect there was not a significant enrichment of the used software and there were no new technologies or programs 'discovered' that would help or develop the work of pupils and teachers with information technologies.

The original specification outlines points that are closely related to the choice of technological tools from four perspectives: *1) selection of tool, 2) appropriateness of the tool, 3) the functions and limitations of the tool, 4) it this tool new for me?* These aspects are appropriately chosen, however, in practice they were mostly disregarded, respectively pupils were not very motivated or compelled to discover new tools and new possibilities of digital technology.

In the original specification, and thus during the pilot testing of DIYLab, there was hardly ever paid attention to notice the learning process of pupils using digital technology.

Documentation of the products themselves were numerous, mostly using a digital camera or camera recorder. By improving in this area during processing activities, there can be seen the potential for enhancing digital literacy among students and also to create incentives for subsequent self-evaluation and evaluation of the learning process and learning outcomes.

CZECH UNIVERSITY

When we started to proceeded DIYLab activities in WP02 “Formation in support of DIY

Education and design of the DIYLab” we spent a lot of time in discussion with our colleagues from other departments about what digital technology ought to be used in school for, what digital technology serve to pupils for and what is a didactic value of digital technology. We refuse to accept the idea proposed by some our colleagues that digital technology must be used automatically at all costs in all subjects and activities in education. We cared about the DIYLab activities should be interesting and attractive for student teachers with inter-disciplinary overlap. In WP02 originally, we discussed also about themes related to chemistry, unfortunately at the end the collaboration with the Dept. of Chemistry was not carried out because the staff of this department started to collaborate in another EU project focused on digital technology in Science Education in primary and secondary schools.

In implementation of DIYLab activities we endeavoured in the highest degree to take into consideration all six key requirements accepted together with our partners from Spain and Finland (inquiry-based learning, collaborative learning, digital literacy improvement, selfregulated autonomous learning, cross-disciplinary approach, relation to curriculum) together with another requirements proposed[2] in collaboration with our colleagues from the Faculty of Education (*overlapping into practice - connection between school education and out of school interest*; *usage free available HW and SW*; collaboration within a course, collaboration cross courses within one field and among various branches (fields)). DIYLab activities organised in WP04 differed in a degree of filling up of these parameters.

Review

All partners and participating educational professionals use time and preparation to implement DIYLab - action according to (WP2) specification. Even if the initial specifications were made with stakeholders, actual

[2] ČERNOCHOVÁ, M., JEŘÁBEK, T. (2014) D. 2.5. Local Report: DIY Lab Specifications - Czech University. December 2014.

implementation with pupils and students, required reasoned localization and understanding about the pedagogical and philosophical basis. Every school, class and teacher did DIYLab in their own way but still consistently.

The remarkable result of the pilot was that the in the end, focus groups saw the actions as meaningful and goal oriented action. Not just following the specifications, but doing the learning and development process. Even the youngest pupils thought that they have learned something for the next realization. - Either concrete skills or mental abilities. Many teachers said that the pilot "forced" them to evaluate their thinking and school practices in a good way.

3. Proposals of improvements and specifications for future DIYLabs

SPAIN

After sharing the processes and overcomes from WP5, in response to the first aim of this report, we approach to the second one, in which we develop the recommendations for improving future DIYLabs. In this section we will describe these improvements that arise from a convergence between the experiences foreseen in WP2 and those experienced during WP4

PRIMARY Pedagogical improvements

Some students comment that they would remove the work cards, as well as they claim more outdoor activities.

- Prepare students for DIYLab project:

> *"And prepare them for working with do it yourself [philosophy]. That is, from nothing we must propose something, but it must be meaningful, it has to have an aim, an initial approach, knowing how the project can go. If we propose working based in DIY without having these bases clear, is like an ocean, they won't know where to go or what to reach for"*(Teacher 1)

- Teachers must be able to define more in what to work on rather than leave the project so open for students. Negotiate this freedom of choosing the topics in which work about:

> *"At the moment, we are still working with this open methodology, but behind this freedom, there are clear aims. Students must know what they have to achieve, although it is a deal. Although the product is [student]"look, I want to do this" [teacher]"ok, but how do we do that?" Right? [teacher]"And maybe this is what you don't need. Let's see how…"* (Teacher 1)

- Make sure that teachers receive a good training in order to make easier to change their role towards a more guiding teacher.

SECONDARY Pedagogical improvements

Assesment: The emergence of new notions of learning and new ways of working in the classroom, have done imprescindible improve the evaluation forgetting written exams which do not respond to new elements that need evaluation. The improvement carried out by the school, that is already part of the current dynamics of many activities ' for instance Work of Synthesis 9' is introducing the idea of using an assessment rubric. This allowed to evaluate the end of a process and not the end of a product, and realize that most students internalize what they have learned.

Teacher 1:*Sometimes I have doubts about if pupils have achieved the skills*

.... I have fear to get it wrong when I need to think about one numerical mark

Teacher 2: *How we have done it, how we organized ourselves, what problems we had, how we solved it .... It is a different way to analyze our own learning methodology.*

Teacher 2: *Initially b it seems strange to analyse your own learning, but when you go ahead with it, you can improve what you haven't done well with....*

- **Management class-group:** Reduce the number of students and have more reference teachers; In order to generate synergies among more advanced students and those who need more help, thus they can help each other.

- **Relationship between students at different levels:** Need to establish relationships between several small working groups to enable pollination between projects and allow these to improve in every sense.

Teacher 1: *I can see there are people within a group that do not progress and more advanced groups, hence we mix them so they can help others too.*

· **Relationship to the curriculum:** Relaxation in the relation with the official curriculum due to the methodological change.

Teacher 2: *We have relaxed a lot, because the methodological change forces us to relax otherwise `you die`.... How can we fit together a rigid curriculum with the implementation of these slow methodologies?*

· **Strengthen public projection of the projects:** this causes a positive pressure on students and generates a sense of responsibility when working.

· **Share process:** Allow the contact between different areas of work in order to grow and help to built a knowledge network.

· **Scheduling agreed between students and teachers** before starting, in order to avoid anxiety and under-achievement of objectives due to lack of time.

· **Empowerment more intuitive learning than structured:** Listen to the

learning's needs that the students manifest in every moment of the project.

PRIMARY: Technological improvements

One computer per student: in this course each student has his own computer. This gives them more flexibility to work in groups and more autonomy, as they share their works in the cloud and each member of the group can progress individually, spending the wished time in the project, as well as agree with their group classmates in extracurricular times of work. When the implementation of DIYLab ocurred students only had one computer per group, having organizational problems that led them to delivery delays (as they couldn't split each other for searching information in internet at the same time). Sometimes also the information was lost due to mistakes in storage the work in pen drives when they wanted to continue working in home.

Student 1: *Sometimes in groups . . . there were disputes because one of the member wanted to use the laptop and another one wanted it too....*

Student 2: *It was a little bit heavy because there was not Google Drive.*

Mediator: *So, you have introduced Google Drive this year*

Student 2: *Yes, because now each of us has a laptop, while last year there was one laptop per group*

Good WiFi

Better infrastructure in classroom: enough plugs to recharge laptops' battery or connect other devices.

· *"Working with technologies should be balanced with an intense work in managing emotions, expression and recognition of feelings, "help them [students] to be psychologically strong and flexible persons"* (Mother 1)

SECONDARY: Technological improvements

Improve connectivity wifi
A laptop for every teacher: understand that the computer is the work tool of the teacher and allows them to plan and work better, and be more relaxed. The spending is understood in terms of investment

Working open software: Currently the school combines the use of Windows Office package and also uses some free digital tools such as those offered Google services. Some teachers want the total use of open software.

PRIMARY: Organizational improvements
Have a set of human resources and permanent support staff in classroom for attending and track the students' work.

> Teacher 2: *These activities must be done with two persons in classroom.*
>
> Teacher 1: *Two? Ideally would be much more but… well, indeed, if you are looking for a real tracking of the work of each group of three students, each one with each own topic, we would need more people....*

Fostering moments of reflection for both teachers and students about their own learning processes related with the projects they are developing. This would make easier to provide continuity to the projects:

> Teacher 2: *I think that if there is a permanent teacher, as we have experienced, which means that tutors lead the project, other teachers that also were involved found difficult know how to continue, as they had missed some parts of the process....*
>
> Teacher 1: *You found yourself having to catch up [about what students had worked with other teachers].... It is also difficult for the tutor, because she left [leaving pendant work to be continued for another teacher] but she has to come back afterwards....*
>
> Mediator: *And she didn't know what had happened*
>
> Teacher 1: *You didn't understand what had happened, or how students had progressed, or which doubts had arisen.*

SECONDARY: Organizational improvements

- Working with smaller groups when working together in classroom.
- Have more teachers per class in the same time.
- Increase the time devoted in each steps of process.

(PRIMARY): How to implement improvements? What is required to be updated, modified, added?

For the implementation of improvements led from the general adoption of the Diy philosophy we have started a reflection process of our teaching in the teacher council setting. This process will lead to an establishment of methodological, organizational and curricular changes, including:

Pedagogical field
Developing a project based on the methodology Design for Change, in which students from upper level propose improvements in different scopes of the lower cycle. Taking them into account whenever possible or coherent with the Educational Project of the Center.

Introducing activities in which the student is able to document reflections about how she learns and what is this learning for, fostering a metacognitive self-regulated learning.

Transferring DIY philosophy to other teachers as a best practices in order that they have a minimum training.

Curricular field
Reviewing and updating of all areas' programming, in order to assure its transdisciplinarity and competency approach.

Reviewing curriculum of Primary: areas and competencies, duration of the lessons, hours for working in APB, human resources.

Methodological field
Reviewing the design of the projects developed in ABP, in order to define clearly how and where to search for information and give to students a coherent progression on their autonomy in work.

Using rubrics for collecting data related with DIY philosophy.

(SECONDARY): How to implement improvements? What is required to be updated, modified, added?

Curricular field
Review the schedules of all subjects in all stages to ensure that have a transdisciplinary and competency approach

Review the evaluation (criteria and tools) according to the learning of competency.

Methodological field
Review and adaptation of interdisciplinary projects to DIY philosophy: empowering of self-directed learning, research and meta-reflection around learning (what and how and why it worked, and thus what worked and what I have to modify.)

Organizational field
Start a new pilot experience of a new 3rd course of secondary timetable, which includes the establishment of project work modules of 1h 30min.

Change of furniture in the classrooms of 1st course of secondary in order to encourage the creation of different learning environments which suit the individual needs of students

SPAIN (University):

In this section we collect the suggestions for improving the planning and implementation of future DIYLabs that arise from a convergence between the planning in WP2 and those experienced taking place during WP4. We take into account comments of both students and teachers participating in the focus groups and the content of the coordination meetings held along the implementation process, in which the 22 involved teachers regularly participated. Improvements proposed in WP4 (D4.2), are also considered.

There is a general need of further exploring and explicating the components of what can be considered as a DIYLab. As mentioned earlier, we concibe DIYLabs as as flexibles space where participants introduce, develop and use inquiry-based projects centered, as far as the syllabi permit, on their interests, connecting different subjects and topics, and using different kinds of educational resources, in particular digital technologies. However, both the meaning and the pedagogical, technological and organizational dimensions of this notion need to be further developed. This is a fundamental issue for the exploitation stage (WP8), as ideas developed and implemented in this project cannot be converted into a closed protocol, but understood as intellectual tools to foster do-it-yourself/think-by-your-self teaching practice.

The next sections summarised the pedagogical, technological and organizational improvements suggested.

PEDAGOGICAL

DIY philosophy

- There is a need of further exploring with students the implications of DIY philosophy in the teaching and learning processes.
- The fundamental transformation of students' role from consumers to prosumers, requires reflection spaces between students and teachers to enhance a pedagogical relationship build on mutual trust and responsibility-

Collaborative learning
Working in groups does not necessarily mean collaborative learning. We need better methods to:

- Decide, together with the students, the composition of groups.
- Foster collaborative skills among students allowing them both reflecting upon their contribution and acknowledging the learning achieved.
- Encourage collaborative teaching and learning processes among students and teachers, by recognising students' backgrounds and avoiding behaviourists, transmissive and authoritarian positions.
- Demonstrate individual learning and results in group work.
- Make the most of the potential, skills and knowledge of each participant in each group.

Assessment for learning
Regarding assessment, teachers show more worries and doubts than students. In the implementation of DIYLabs we tried to foster and develop the notion of assessment for learning (Black, Harrison, Lee, Marshall, Wiliam, 2003), rather than of assessment of learning. To deepen this perspective in a teaching culture geared to a final numerical grade, we must:

- Improve teachers' competence to be able to develop different assessment methods and mechanism adapted to the characteristic of the different projects developed by students.
- Continue to promote a change in students and teachers conceptions on the role of assessment in the teaching and learning process.
- Go on developing diversified ways of analyzing and assessing DIY digital objects.
- Foster co-evaluation (students – teacher; students – students) schemes.
- Further develop diversified forms of analysis and evaluation of DIY digital objects.

Beyond digital technologies
Students highly appreciate the digital and visual dimensions reflected in DIY digital objects and and used different digital tools through the teaching and learning processes as a whole. Teachers, meanwhile, suggest not only focusing on these dimensions of he DIY digital objects, but further develop:

- Teaching and learning methodologies to foster independent and self-regulated learning, students centered teaching, students' agency, etc.

Other issues to be considered
We have also identified other aspects able to improve and expand the potential developed in this project, which can be fundamental for innovating and improving higher education.

- The need to further clarify with students the public dimension of the digital objects uploaded in the DIYLabHub. The authorship is safeguarded because their names appear in the production, but they have to sign the acceptance protocol to be included in the DIYLabHub.
- The need to further explore how to use DIY digital objects as learning materials with other students.
- The need to increase our confidence in students, in their ability to learn and their passion for learning.
- The need to explore new ways to motivate and involve students.
- The need of improving the ways and methods to explore students' positions and knowledge about the underlying philosophy of the project.
- As teachers, the need to set out cognitive and emotional challenges and disruptions that allow us to move from the known to the unknown.
- The need to face the uncertainty of whether presenting examples to students can reduce their creativity and increase their tendency to reproduction and copying, or it can be a source of ideas for the development of their own learning projects.

- The need of avoiding inertia and going on exploring and implementing all the possible educational dimensions of DIY philosophy and DIYLabs implementation.
- The need to further deepening and go on building on the theoretical foundation of the project.
- The need of guaranteeing the sustainability of the innovation brought about by the project.
- Even if compliance with this requirement is beyond the institutional decision-making capacity of the participants in this project, it is perceived as a general requirement the need to implement DIYLab and its underlying educational philosophy in a more transversal way through the curriculum.

TECHNOLOGICAL

All participants in the project (students and teachers) see the need of further developing and improving:

- The intensive use of technology (not only digital but understood as all available resources) from an educational and critical point of view.
- The use and development of multi-literacies and modes of expression and communication.
- Contemporary approaches to diversified representations and conceptions of knowledge.
- The access to technological resources. The institutional framework and working conditions of teachers are seen as a challenge to have the human and material resources necessary to perform the work once the project ends.

ORGANIZATIONAL

As known, the project has been developed and implemented in an institution and a number of degrees, which held a disciplinary based vision of knowledge resulting into fragmented and compartmentalised curricula, time and spaces. So, DIYLabs have been mostly implemented inside subjects. On the other hand, considering that some subjects have several groups, with teachers who can work quite isolated from each other, we have very little room to deal with organizational aspects.

However, the detected needs to improve the organizational dimensions of the project are.

- Working in smaller groups. It is difficult to implement DIY philosophy with 60 or more students.
- Invite more teachers to join in the adventure, making possible more transversal implementations.
- Include these issues in all institutional instances, which deal with curriculum matters (coordination meetings, Boards of Studies, etc.).

In the exploitation stage (WP8) we plan to contribute to improve the institutional organizational aspects.

As for the European dimension of this project, students and teachers missed more opportunities for collaboration with other participating institutions, beyond exploring their experience through DIY digital objects available in the hub DIYLabHub. As a matter of fact, we explored this topic in different coordination meetings of the consortium. However, the scope of the project, the institutional constraints and the problems with the languages have been considered as powerful barriers to collaboration.

(UNIVERSITY) How to implement improvements

To be able to implement the envisioned improvements, we are planning to work in different directions.

At the group of participants level. All teachers participating in the implementation of the project are ready to go on deepening and expanding its innovative potential and will continue:

- As an innovative teaching group at the University of Barcelona.
- Mulling over and implementing DIY philosophy in the different subjects, improving the definition and realisations DIYLabs.

- Fostering coordination with other colleagues.
- Actively participating in group meetings to think about plans and processes, taking decisions and developing methodological and assessment tools.
- Taking part in professional development activities.

At Faculty level. All teachers participating in the implementation are willing, to the extent of their possibilities, to introduce the need of implementing DIY related philosophies at:

- Subject coordination meetings.
- Department Academic Commissions.
- Studies Boards.

At the moment there is the plan of developing a new curriculum for undergraduates in order to adjust the current 4 year degree, to the more common European standard of 3. When this process starts, we are also ready to expose the project's ideas and ensure they are taken into account.

At University level. We envision contributing to the improvement of the institutional organisation, especially in the exploitation stage by organising:

- Workshops open to all academics of the University of Barcelona.
- Seminars addressed not only to academics, but also to administrators, and students of all universities.

FINLAND

In the interviews, positive atmosphere and willingness to develop are reflected. The challenges and the drawbacks were told with searching for the solution.

Several comments already contained an improvement proposal to the problem. Thinking of the future realizations, the improvement themes in discussion, which are shared in all the target groups, are:

The planning:

Developing the teacher's profession and the self-development are part of the preparations, which belongs to the DIYLab activities. It is often necessary to adapt regarding the relations between one's own work and other teachers' work.

The language awareness of the new method and discussion about the concepts both for the teachers and the pupils, makes possible to plan and to concentrate resources to important things from the point of view of the learning . (The language aware teaching is included in the new Finnish curriculum.)

The language awareness of the new method and the discussing the concepts both for the teachers and the pupils, makes possible to plan and to concentrate resources to on important things from the point of view of the learning . (The language aware teaching is included in the new Finnish curriculum.)

Good preparation and foundation creates the playing field to the implementation of the DIYLab activities. It makes possible to give the realistic freedom to the pupils and at the same time the preparations directs activities pedagogically in a reasonable direction.

The pupils' work must be connected with the curriculum. The DIYLab activity is for example a good way to carry out multidisciplinary (cross-topic) learning, which is mentioned in a new curriculum.

21st century skills as an objective are playing an important role in the new curriculum. They are paying attention to general skills and evaluation. Important in the pupil evaluation of the DIYLab operation is continuing, the personal evaluation of a process and skills of the pupil. (Social skills etc.). The end product is only the top of the iceberg. The principles of the evaluation should be transparent and they must be discussed also with the pupils

Schedule and time:

The operation of the school has been strongly bound to the scheduling. All planning which affects schedules must be made in time. The operation which affects a timetable in principle belongs to the planning and preparation phase of the school year. Often the operation affects also such teachers and classes which do not directly participate in the activity, but for example through the use of premises.

The cooperation and shared planning between the teachers are important and enough time must be reserved for them.

Also the smaller projects can be carried out in DIYLab way, if they are designed to be short and small. The pupils do not like too long or simultaneous projects.

The DIYLab philosophy contains individuality and flexibility but attention must be paid to the pupils' plans and working. The activities inside the project must not be scheduled too fixed and teacher have to guide the pupils' planning process.

The normal work of the school includes teachers' and pupils' illness absences, remedial teaching, feast days for the whole school etc. For the exceptions one has to prepare and there must be time and flexibility for them in the plans.

Premises and (ICT) devices:

In addition to the class, group work premises are needed. Peaceful rooms and controlled work premises are also needed, depending on the project, for example. for the chemistry work or making video recordings.

The information technology must be operating everywhere (wifi). Both the teacher and the pupils have to have a shared resource/place for files and and access to the resources of the Internet . (Cloud service, a learning environment etc..)

The central applications of the information technology must be practised beforehand but the independent initiative of the pupils also must be allowed even if the teacher do not manage the application. (Free internet resources, services and apps.)

Parents / guardians and the society:

The traditional partners in cooperation of schools are worth taking in to the productive use (library, other schools, university and international networks)

According to the age level pupils should give the opportunity to the international cooperation.For example through the presentation of outputs or via discussion/chat messages.

Parents can be taken along to learn with the child but only ” according to the principle of the voluntariness, ”.

The parents can not be ordered to participate in the schoolwork, nor to put the pupils in a difficult intermediary in the getting of parents with.

The parents are not teachers and their contribution should come via the own child's work (support and interest) . More profound participation in the project, for example through an own profession or know-how, is nice exception but it should not be required from every pupil /parent.

How to implement improvements?

In improvements required by the DIYLab operation, essential is to pay attention to all dimensions early enough. For example the acquisition, which are directed to the premises and devices, affects it through the budgeting with the delay of the year.

At the preparation phase the role of the management team of a headmaster and/or school will be emphasized, but the enthusiasm and involvement of all the teachers are essential..

The DIYLab is not a separate islet in the school but it is a part of the general pedagogic developing of the school, in line with the policies of the new curriculum and digitalization.

On a quick schedule the important factor in the DIYLab is changing the methods and models of the work. Directing the existing resources to the new and creative use does not always require financial resources but energy into the teachers' education and informing

Good planning and informing to all participants, is required to develop activities to the right direction.

Information technology resources of schools varies, but the planning of the activities and the use of the free tools and resources of the Internet (social media tools etc) in the teaching is significant.

The use of the pupils' own devices, such as smart phones, should be technically made possible with the help of the WiFi, which is covering and operating in the school.

Agreements and restrictions which are related to the use of the own devices, copyrights, e-safety etc., should automatically make in the beginning of the semester to enable the DIYLab activities. This requires informing and involvement of the parents.

CZECH (Schools):

Based on the aforementioned findings, it is possible to design a set of recommendations to change the original specification, or new measures that would contribute to better achievement of the original goals of the DIYLab project and pedagogical, organizational and technological principles and the principles defined by ZŠ Korunovační within the specification of DIYLab.

Organizational and pedagogical perspective

- modify the organizational framework of education
- Goal: to ensure better temporal and local conditions for research and project-based learning / teaching
- One of the main problems is the length of lessons, respectively 45min time limit of one class the teachers of 2nd grade have with their students. This organizational approach to teaching where the lessons are thematically very different does not suit the teaching in the context of longer or more complex learning activities. A possible way is to deploy multiple project days, which would be clearly set ahead (eg. at the beginning of the school year) and teachers could take them into account in advance. The ratio of the project and the normal lessons is obviously a sensitive issue and depends on good planning at the beginning of the school year. In an interview with the school management, it is clear that this is necessary to plan well ahead. Another way of how to provide the students with more space is to move their educational activities outside of school education and to encourage more autonomous activity of students in their spare time.
- allowing a greater degree of involvement of students in the design / selection of activities or themes of these activities
- goal: to increase motivation and passion of pupils for teaching
- Pupils should have more "freedom" in choosing activities, respectively the topics, because it naturally leads to higher motivation and precision of processing the activities. This applies more to pupils of the 2nd grade. One possibility is e.g. an invitation to a range of activities which are not limited to a particular class or group of students. Students would be able to choose certain topics regardless of the grade and class in which they currently study, and activity would subsequently be adapted to a given group of students who chose it. It would also lead to higher intergrade and interclass social communication among pupils.
- allowing a greater degree of involvement of students in processing activities (processing method, type of activity outputs, presentation, evaluation criteria)
- goal: increase motivation and passion of students for teaching; to teach pupils to study and work with self-evaluation
- This requirement is closely related to the preceding one. If the pupils are more involved in the design of the task itself, the design of criteria for the evaluation of their work, etc., they themselves will know better how their activities should be directed and what they should pay attention to when processing activities. It is possible to assume that this will also increase students' motivation and more clearly crystallize the possible roles of students in the team.
- to provide greater feedback between teachers during individual activities
- goal: to motivate teachers to innovative approaches and further professional growth
- Teachers should communicate more among themselves during activities and share their observations of individual activities, which may inspire other colleagues and also to help solve problems that have already occurred in another group / activity. During the semester there should be seminars taking place in which teachers would briefly present the progress of their activities and provide each other with feedback from a pedagogical, organizational and technological perspective.
- Involvement of parents
- Goal: to strengthen the positive link parent-school
- Some parents have an interesting profession that can be inspiring for both pupils and teachers. The elementary school used this fact several times and some parents gave a presentation to students or teachers. This form could be used much more frequently, because in addition to the actual enrichment of teachers and pupils it also leads to deeper parent-school relationships.

Pedagogical and technological aspects

- using own tools by pupils goal: to expand the range of tools that students know and with which they are able to work
    - Pupils should be more "pushed" to individual search and selection of appropriate digital tools for the processing of the tasks or problems.
- emphasis on defending the choice of instruments by pupils ○ goal: development of digital literacy; pupil should understand why the currently selected tool is suitable for him and why other tools are not
    - The pupil should be able to specify the reasons why he chose the given instrument, to know its potential in more depth. Then they can possibly recommend the tool to their to classmates or teachers.
- To ensure that every teacher has their own personal working device (tablet or notebook)
    - goal: to increase digital literacy of teachers; enable teachers to respond flexibly to new impulses and ideas from pupils and their colleagues in the field of new applications and possibilities of using DT in the classroom.

The school should provide every teacher (if unable or unwilling to use their own equipment) a laptop, or tablet. In this respect, it is advisable to choose a uniform concept in terms of operating system (mainly for tablets), but with regard to the equipment already used by some teachers and not dogmatically

CZECH (University):

The specification which we designed and introduced in WP02 for DIYLab activities seems to be enough for future DIYLabs. In common discussion with colleagues and student teachers we will engage

- which professional problems student teachers solve out of their university study, which questions they are occupied, which creative activities they do with digital technology in their leisure, etc.
- a greater and deeper attention how to motivate student teachers at the beginning of DIYLab activity
- analysis of ready artefacts and objects published on DIYLab HUB and together with student teachers to think not only about “technological” way how these objects were come to into existence and which content (message) they bring
- learning how to understand DIYLab objects in different contexts and to study which cognitive processes should have been employed in their production and formation
- identification of themes and topics for DIYLab activities,
- analysis of DIYLab objects from didactics point of view to identify their didactics value,

the theoretical anchoring of DIYLab philosophy and how to interconnect DIYLab approach with constructivist approach to learning

(UNIVERSITY) How to implement the improvements? What is it need to update, modify and add?

The most important is to design DIYLab activities and to realise them with students. For Future

DIYLabs it would be very important

- to improve a way how to motivate student teachers to participate actively in DIYLab activities and to bring own ideas from their out-of-school life into educational contexts,
- to do didactical analysis of the DIY objects published on DIYLab HUB and to learn more from these outcomes,
- to motivate colleagues from other department to collaborate in DIYLab approaches to problems solved by student teachers and to implement inter-disciplinary contexts of these activities,
- to acquire methods and pedagogical theoretical basis how to record and visualise learning process proceeded in DIYLab activities using digital technology,
- to identify interests and topics which student teachers are interested in their free time out of the faculty.

There are some examples of ideas for DIY activities:

- city in which I am studying in student teachers eyes (stories and ideas what to change in the city to benefit of university life and students, …),
- teacher profession from a perspective of student teachers,
- a digital book about how the city was growing and changing in a period of last hundred years (to compare photos of a set of places from a time linear perspective),
- almanac (life of the department, life of a student group, …),
- robotics application at home (based on usage of free available robotics sets at home,
- to prepare criteria how to assess student teachers in DIYLab work.

-

Review

All partners and focus groups have found many proposals to “all levels”, to improve and enable better future implementations.

Most of the suggestions are very practical and applicable, without big organizational or financial changes. Some of the classes have already done new implementations. -However, there are also bigger proposals and "wishes" e.g. for curriculum and technological infrastructure.

All these proposals are very related to the country and the school. Finnish teachers for example can rely on coming new curriculum, whereas in other countries the educational reform is not yet in the same phase.

One shared guidance is, that preparation and planning have to be done beforehand. - Sometimes a year before the action. Various skills must practice with students beforehand. Even if the DIYLab working itself is flexible and creative, and maybe just for that, it requires planning and time for the realization.

5. To conclude

Note: All following conclusions of the project countries are referring to the texts in their local reports, which are scattered thematically in this summary report.

SPAIN (Schools):

As reflected in this report, the aims of this WP have been achieved, reviewing in detail the implementation period through a significant representation of participants involved. The activities carried out for school teachers, supported by professors from the University of Barcelona, have allowed to establish which improvements have to be taken into account for guarantee the sustainability of the project.

In addition to this, some reflections covered in this report will be useful for developing next phases of the project: socioeconomic assessment, dissemination and exploitation.

SPAIN (University):

As reflected in this report, the aims of this WP have been achieved, by reviewing in detail the implementation period through a significant representation of participants involved. The activities carried by teachers of the University of Barcelona, have allowed establishing the improvements to to be taken into account for guaranteeing the sustainability of the project.

In addition to this, reflections covered in this report will be useful for develo¬ping next phases of the project: socioeconomic assessment, dissemination and exploi¬tation.

Finally, the University of Barcelona, as much universities, regarding teaching, seems more concerned with preserving and transmitting the past (Debray, 2001) than with inventing and creating the present and the future. So, we have to deal with compartmentalised and fragmented notions of knowledge, time, and space. For this reason, we note once again the enormous challenge and excitement involved in trying to implement the DIY philosophy, self-managed, self-paced, and focused on the interests of the people, in such a traditional structure.

An excitement that increases by seeing that while the dropout rate of university studies is around 20%, the percentage of those who do not finish our courses is between 0 and 10%

FINLAND (Schools):

The main contribution of the piloting DIYLab was a change in the attitudes of the teachers . Teachers got realism and skills for the many-sided operation. Many times DIYLab does not look very different, compared with the traditional teamwork of the class, but the change is significant from logical and pedagogic starting points. During the project, we encountered many times the fact that the workday of the school is busy and many factors and changes "disturbs a normal day" and make planning difficult. Despite that, the teachers experienced that there is a need for the new pedagogic ways of action and thoughts. It may be that "the normal of the school " exists only in the memories and the pupils' and teachers' schoolwork will change unavoidably when the society changes.

The role of the school as a representative of the stability in the society and in the pupil's life, must understand in a new way and the teaching has to focus on pedagogy, pupils and the future.

In Finland, the piloting of DIYLab happened at the same time with the preparatory work of the new curriculum.That was known already a couple of years ago when activities were designed. The DIYLab pilot gave the teachers incentive to develop their own activities. At the same time, the operation was a good concrete case about a new way of teaching. This can be considered from the point of view of the teachers, as a good timely coincidence, but at the same time it also shows the fact that DIYLab is relevant and up-to-date pedagogically and as a way of action..

CZECH (Schools):

ZŠ Korunovační implemented the basic common (for the project) specification of DIYLab into more detailed principles and rules which more correspond to the principles of creative school, which is built on the SEP. These principles the school sought in the implementation of DIYLab (WP4) and fill and most of them flourished. Some principles (eg. use of new and freely available software) failed to materialize. Based on the analysis of the original specification, implementation of DIYLab and data obtained from interviews with pupils, teachers, parents and school management, the areas and issues were identified in which there is room for improvement or change of attitude so that the original intentions were filled in relation to the involvement of DIY philosophy to teaching at school. These areas are mainly: (a) the organizational structure of the school year and specific classes, (b) the role of teacher and pupil, and the degree of pupil autonomy, (c) the integration of new technologies. With these areas the specific recommendations and proposals are related for the solution of the problems that were mentioned in Chapter 3.

For ZŠ Korunovační brought a pilot deployment DIYLab interesting and useful findings. 2nd grade elementary school appears to be very suitable for integrating this concept of DIY philosophy, pupils are able to work independently and in the long term, but they still need some correction from the teachers. Conversely 1st grade pupils seem to be too young for the approach to teaching in the spirit of DIY. You can not ask from them too high degree of autonomy and they need much more guidance in learning. Also the work with digital technologies can not be too difficult for the first graders. DIYLab concept does not seem appropriate for the first grade.

ZŠ Korunovační wants, in the next school year, to apply the principles and approaches that have been proven, and many of the above comments already incorporates continuously in the planning of concept of teaching.

CZECH (University):

At the Faculty of Education we will continue in DIY philosophy implementation and develop

Future DIYLab in a frame of teacher education. Therefore it would be necessary

- to include the DIY philosophy as a teaching approach to digital literacy development into theoretical framework of digital literacy pedagogy,
- to support didactic thinking of ICT student teachers to be able to design and realise DIYLab activities in school practice,
- to integrate into teaching of student teachers assignments like as DIYLab activities,
- to occupy systematically and in more details with what student teachers do with digital technology in their free-time, which types of problems they solve with technology, how they spend their free-time with technology and to endeavour to exploit their expertise and experiences in ordinary teacher education.

ANNEX 1

The questions for focus groups (WP5, February – March 2016)

The aim of the focus groups is to identify the strengths and the weaknesses in DIYlab actions. Furthermore the target is to make some recommendations for the future. There is also a need for assess the development of digital competence during the DIY actions.

QUESTIONS FOR PARENTS AND TEACHERS

The philosophy

· After the DIYLab activities in schools/universities what do you find as DIYLab philosophy in a nutshell?

· Strenghts and valuables

· Weaknesses and problems according to a curriculum, a school, a group, a teacher, a student?

· How would you describe possible changes in your attitudes during the DIYLab activities and learning.

The activities

· What there has been done in schools/universities? What has been done differently than before?

· Strenghts and valuables

· Weaknesses and problems

· Describe the operational environment? What kind of technique were used and how? Give one example. · Describe the development of the ICT skills of the students. Did you recognize any development? If some, identify the skills.

· Do you see any possibilities to apply the influences and skills from the school/university to the outside world or from one classroom into another? What about the tools?

· Have you used the skills, abilities and other influences somewhere else?

· Describe the possibilities to adapt the DIY philosophy into the curriculum. For example how you should evaluate the learning and activities like DIY? Have you any fresh ideas after the activities?

· The future

· How do you see DIYLab in the future in your school/university? What would you keep, what would you throw away?

· How about the cooperation between the schools/universities and the homes of students and the rest of the outside world.

QUESTIONS FOR STUDENTS

The philosophy

· After the DIYLab activities in schools/universities what do you find as DIYLab philosophy in a nutshell?

· Strenghts and valuables

· Weaknesses and problems according to a curriculum, a school, a group, a teacher, a student?

· How would you descripe possible changes in your attitudes during the DIYLab activities and learning.

The activities

· What there has been done in schools/universities? What has been done differently than before?

· Strenghts and valuables

· Weaknesses and problems

· Describe the operational environment? What kind of technique were used and how? Give one example. · Describe the development of the ICT skills of the students. Did you recognize any development? If some, identify the skills.

· Do you see any possibilities to apply the influences and skills from the school/university to the outside world or from one classroom into another? What about the tools?

· Have you used the skills, abilities and other influences somewhere else?

· Describe the possibilities to adapt the DIY philosophy into the curriculum. For example how you should evaluate the learning and activities like DIY? Have you any fresh ideas after the activities?

The future

· How do you see DIYLab in the future in your school/university? What would you keep, what would you throw away?

· How about the cooperation between the schools/universities and the homes of students and the rest of the outside world.