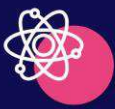


Deliverable 1.5 - E-learning platform specifications

D1.5 - Intellectual Output #1 - Part #4

AN EDUCATIVE PLATFORM BASED ON MAKECODE, CIRCUITPYTHON & SCRATCH FOR CREATIVITY AND PARTICIPATORY SCIENCES USING IOT BOARDS





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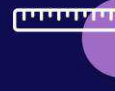
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Let's STEAM

An educative platform based on MakeCode, CircuitPython & Scratch for creativity and participatory sciences using IoT boards

D1.5: Technical specifications of the e-learning platform

Authors: Alexandre Soares, Angel Shotev (EP)

Date: 03/06/2020

LET'S STEAM is funded by the European Commission within its Erasmus+ Programme,

under KA-2 Cooperation for innovation and the exchange of good practices,

Strategic Partnership for School Education

Project Number: 2019-1-FR01-KA201-062946

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LINKS WITH INTELLECTUAL OUTPUTS

IO	Describe links with IO
Output 1: Pedagogical scenarios	Specifications regarding the e-learning platform for teachers: After understanding the needs of the teachers and the specifications regarding the educational pathway, this deliverable is dedicated to define the specifications for the e-learning platform, which will include the learning content developed for the needs of the teachers. Through the platform, the main objective of the project – the training of teachers – will be facilitated, by extending the range of participating teachers through the possibility of online learning as well as a blended approach of the physical sessions.

DISSEMINATION LEVEL

PU	Public	X
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DOCUMENT APPROVAL

Name	Role in the project
Mickaël Martin-Nevot	Coordinator
Georgios Mavromanolakis	IO leader of IO1
Georgios Mavromanolakis	WP leader of WP1
Georgios Mavromanolakis	Task leader of T1.2

DOCUMENT REVIEW

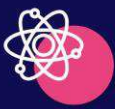
Date	Version	Reviewers
29/05/2020	V1	Alexandre Soares, Angel Shotev
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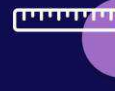
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Let’s STEAM aims at developing a training of teachers’ programme dedicated to computational thinking and creativity skills using IoT board and digital tools at larger scale. The project runs from September 2019 to August 2022. It involves 8 partners and is coordinated by Aix-Marseille Université.

More information on the project can be found on the project website: www.lets-steam.eu

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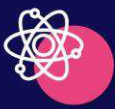
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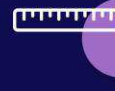
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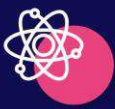
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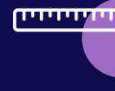
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1. INTRODUCTION

1.1 OBJECTIVES & VISION OF D1.5

The main objectives of the LET'S STEAM project are to provide new set of skills for teachers in order to enhance the capacity of the teachers to use programming practices in their STEAM approach, to promote active and creative pedagogy and to value collaborative behaviours in teaching and learning. To achieve these goals, a main aspect of the project will be to develop learning contents based on the analysis of teachers' digital competences and their needs and requirements. These, in turn, will be adapted to be included in an e-learning platform, which will expand the access to the learning material, as well as enhance interactivity online and stimulate self-training.

Therefore, the main objective of this deliverable is to define the technical specifications of LET'S STEAM's e-learning platform that is to be afterwards developed in Output 3 "E-learning platform for teachers at European scale". It is part of the work carried out in WP1 "Analysis of the different training level needs and technical specifications of the platform" and Output 1 "Pedagogical scenarios including analysis of the teachers needs and translation of their requirements into i) training of teacher's content specifications and ii) technical specifications for classroom development".

1.2 METHODOLOGY

To develop D1.5, the findings of Deliverable 1.2 "Contents specifications, including needs analysis, content definition, methodology and pedagogical scenarios", will be used as it is providing the general and specific recommendations for the "Train the Trainers" programme and the pedagogical scenarios (in short referred as modules), in order to define the needs of the teachers regarding the functionalities that the platform has to include.

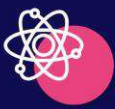
As for the development of D1.3, EP has based the work of e-learning specifications on an impact mapping methodology. Impact mapping is a lightweight, collaborative organisational technique for teams that want to make a big impact on software products. It is based on **user interaction design, outcome-driven planning and mind mapping**. Impact maps help delivering teams and stakeholders with visualise roadmaps, explaining how deliverables connect to user needs and communicate how user outcomes relate to higher-level organisational goals. The results of this work is provided hereunder and will be used to develop IO3. The full methodology of "Impact Mapping" is available in D1.3 and in annexe to this deliverable.



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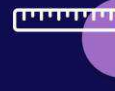
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2. IMPACT MAPPING APPLIED TO THE LET'S STEAM TECHNICAL SPECIFICATIONS' CONSTRUCTION

2.1 STEP 1 – WHY ARE WE DOING THIS? DEFINITION OF FUNCTIONAL GOALS



G1: TRAIN THE TEACHERS

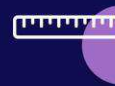
Name	Provide new set of skills for teacher to enhance STEAM approach
Description	The purpose of the e-learning platform is to complement and expand the Training of Teachers programme by providing an online version of the pedagogical scenarios, or modules, outlined in D1.2. Adapting the learning materials that are to be developed in O2, and complementing these with interactive tools, will lead to the creation of the e-learning contents to be used on the platform. This will allow a higher number of teachers, as well as other target audiences, to be able to access it online and participate in the training, and thus increase their programming skills, as well as their knowledge in the inquiry-based methodology and the focus area of ethics, security and relationships.
Related to Impacts	All
Targets	E-learning platform

2.2 STEP 2 – WHO CAN PRODUCE THE DESIRED EFFECT? WHO CAN OBSTRUCT IT? WHO ARE THE CONSUMERS OR USERS OF OUR PRODUCT? WHO WILL BE IMPACTED BY IT? DEFINITION OF THE ACTORS AND ASSOCIATED PERSONA

The following actors are the ones envisioned to influence the outcome in the context of the e-learning platform:

Profile & Description	Linked impacts
Trainers of teachers delivering the Training of Trainers programme to secondary school teachers	IMP1.1: Enroll on the platform IMP1.2: Use the platform to transfer knowledge to trainees IMP1.3: Follow trainees' learning progress IMP1.4: Evaluate the trainees
The trainees more specifically the teachers that will get trained during the ToT programme	IMP1.5: Enroll on the platform IMP1.6: Consult training contents IMP1.7: Being attracted by the courses IMP1.8: Send/Upload additional resources IMP1.9: Evaluate trainees' knowledge IMP1.10: Certify acquired knowledge IMP1.11: Access individual skills' acquisition
LET'S STEAM members (project partners), responsible for development of the e-learning contents	IMP1.12: Build the architecture of the courses IMP1.13: Build the architecture of the assessment tools IMP1.14: Internationalise the platform
Admin , tasked with managing the accounts and the access permissions	IMP1.15: Manage accounts IMP1.16: Manage access permissions



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2.3 STEP 3 – HOW SHOULD OUR ACTORS’ BEHAVIOUR CHANGE? FULL IMPACT MAPPING FOR THE LET’S STEAM TECHNICAL SPECIFICATION

Table 1 – IMPACT LIST – G1: TRAIN THE TEACHERS

ID	Description	Features
Actor 1: Trainers of teachers		
IMP1.1: Enroll on the platform	Teachers need to be enrolled on the platform in order to use it.	F1: Subscribe to the platform F2: Log in / Log out
IMP1.2: Use the platform to transfer knowledge to trainees	Teachers need to upload the courses to provide the training content to the trainees.	F3: Upload the different courses
IMP1.3: Follow trainees’ learning progress	Teachers need to track the learning progress of trainees.	F4: Access to trainees’ dashboard F5: Collect trainees' work
IMP1.4: Evaluate the trainees	Teachers need to perform evaluations of the trainees in order to verify that they understood the course.	F6: Upload different assignments F7: Validate students’ assignments
Actor 2: Trainees i.e. secondary school teachers in their position of learners in the ToT programme		
IMP1.5: Enroll on the platform	Trainees need to be enrolled on the platform in order to use it.	F1: Subscribe to the platform F2: Log in / Log out
IMP1.6: Consult training contents	The trainees have specific expectations as they also are teachers at secondary school. Hence, they will have high expectations in terms of accessibility and ease of use, practice and reuse training contents for their own skills or for transmitting them in a second stage to their learners. They should be able to get self-trained, especially for those who will follow the e-learning pathway.	F8: Display list of courses F9: Interaction with the lesson (open, validate, download) F10: Switch between lessons (next and previous lessons)
IMP1.7: Being attracted by the courses	Gamification system, aimed at sustaining the interest of the trainees.	F11: Rating course system F12: Wall of fame system F13: Scoreboard system
IMP1.8: Send/Upload additional resources	Trainees should be able to send/upload additional documents to teachers or to the platform.	F14: Send documents to teachers F15: Upload documents to the platform
IMP1.9: Evaluate trainees’ knowledge	Trainees need to have their skills evaluated through the completion of the assignments prepared at each level.	F16: Validate assignments
IMP1.10: Certify acquired	Trainees need to be able to show that they have successfully completed a module and acquired	F17: Download certificates/badges



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ID	Description	Features
knowledge	the necessary knowledge.	
IMP1.11: Access individual skills' acquisition	Trainees need to have an access to their dashboard in order to have an overview of their achieved progress.	F18: Access to their dashboard
Actor 3: LET'S STEAM Members		
IMP1.12: Build the architecture of the courses	The consortium partners will be the ones responsible for the development of the e-learning material, based on the 3 focus areas suggested in D1.2	F19: Create/Modify/Delete a course F20: Categorize the courses
IMP1.13: Build the architecture of the assessment tools	The consortium partners will also develop the specific assessment tool which will be used for evaluating the knowledge acquired by trainees.	F21: Create/Modify/Delete an assignment
IMP1.14: Internationalise the platform	Partners will be responsible for the translation of the e-learning platform and the learning material in the 4 project languages	F22: Translation of the platform
Actor 4: Admin		
IMP1.15: Manage accounts	The Admin will be responsible for all the back end of the e-learning platform.	F23: Create/Modify passwords F24: Check if everyone has a password F25: Create/Modify/Delete accounts
IMP1.16: Manage access permissions	Admin will grant trainees and trainers with different permissions in order to ensure the security of the platform	F26: Add/Modify/Delete a permission



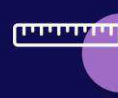
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Figure 1 - E-learning platform functionalities

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2.1 STEP 4 – WHAT? – FUNCTIONAL SPECIFICATIONS

The impact mapping last level has enable identifying a list of 26 features or functionalities given hereunder:

Table 2 - List of features and related impacts

ID	NAME	RELATED TO IMPACTS
F1	Subscribe to the platform	IMP1.1: Enroll on the platform
F2	Log in / Log out	IMP1.1: Enroll on the platform
F3	Upload the different courses	IMP1.2: Use the platform to transfer knowledge to trainees
F4	Access to trainees' dashboard	IMP1.3: Follow trainees' learning progress
F5	Collect trainees' work	IMP1.3: Follow trainees' learning progress
F6	Upload different assignments	IMP1.4: Evaluate the trainees
F7	Validate students' assignments	IMP1.4: Evaluate the trainees
F8	Display list of courses	IMP1.6: Consult training contents
F9	Interaction with the lesson (open, validate, download)	IMP1.6: Consult training contents
F10	Switch between lessons (next and previous lessons)	IMP1.6: Consult training contents
F11	Rating course system	IMP1.7: Being attracted by the courses
F12	Wall of fame system	IMP1.7: Being attracted by the courses
F13	Scoreboard system	IMP1.7: Being attracted by the courses
F14	Send documents to teachers	IMP1.8: Send/Upload additional resources
F15	Upload documents to the platform	IMP1.8: Send/Upload additional resources
F16	Validate assignments	IMP1.9: Evaluate trainees' knowledge
F17	Download certificates/badges	IMP1.10: Certify acquired knowledge
F18	Access to their dashboard	IMP1.11: Access individual skills' acquisition
F19	Create/Modify/Delete a course	IMP1.12: Build the architecture of the courses
F20	Categorize the courses	IMP1.12: Build the architecture of the courses
F21	Create/Modify/Delete an assignment	IMP1.13: Build the architecture of the assessment tools
F22	Translation of the platform	IMP1.14: Internationalise the platform
F23	Create/Modify passwords	IMP1.15: Manage accounts
F24	Check if everyone has a password	IMP1.15: Manage accounts
F25	Create/Modify/Delete accounts	IMP1.15: Manage accounts
F26	Add/Modify/Delete a permission	IMP1.16: Manage access permissions



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3. CONCLUSION

This deliverable defined the technical specifications of the e-learning platform, using as its methodology the “Impact mapping” organisational technique. Based on it, it identified the main goal for doing the specifications, along with the key actors, impacts and respective features. It built on the key finding of Deliverable 1.2, especially related to the needs and requirements of the teachers, the proposed sets of modules – “Programming and IOT Board Functionalities”, “Interdisciplinarity and Integration” and “Ethics, Security and Relationships”, and the Inquiry-based learning strategy.

The deliverable identified as its main goal the training of the teachers, and defined 4 main actors – 1) the trainers of teachers, 2) the trainees, 3) the LET’S STEAM members and 4) the Admin. It defined 16 impacts, along with 26 specific functionalities, which will be regularly updated.

The impacts and features defined as part of the e-platform’s technical specifications will serve as the basis for the work to be done in IO3: “E-learning platform for teachers at European scale”, which will have as one of its main objectives the development and implementation of the e-learning platform.



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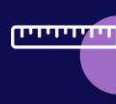
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APPENDIX 1 – IMPACT MAPPING METHODOLOGY

The impact mapping methodology is based on 4 main questioning:

IMPACT MAPPING A CHEATSHEET

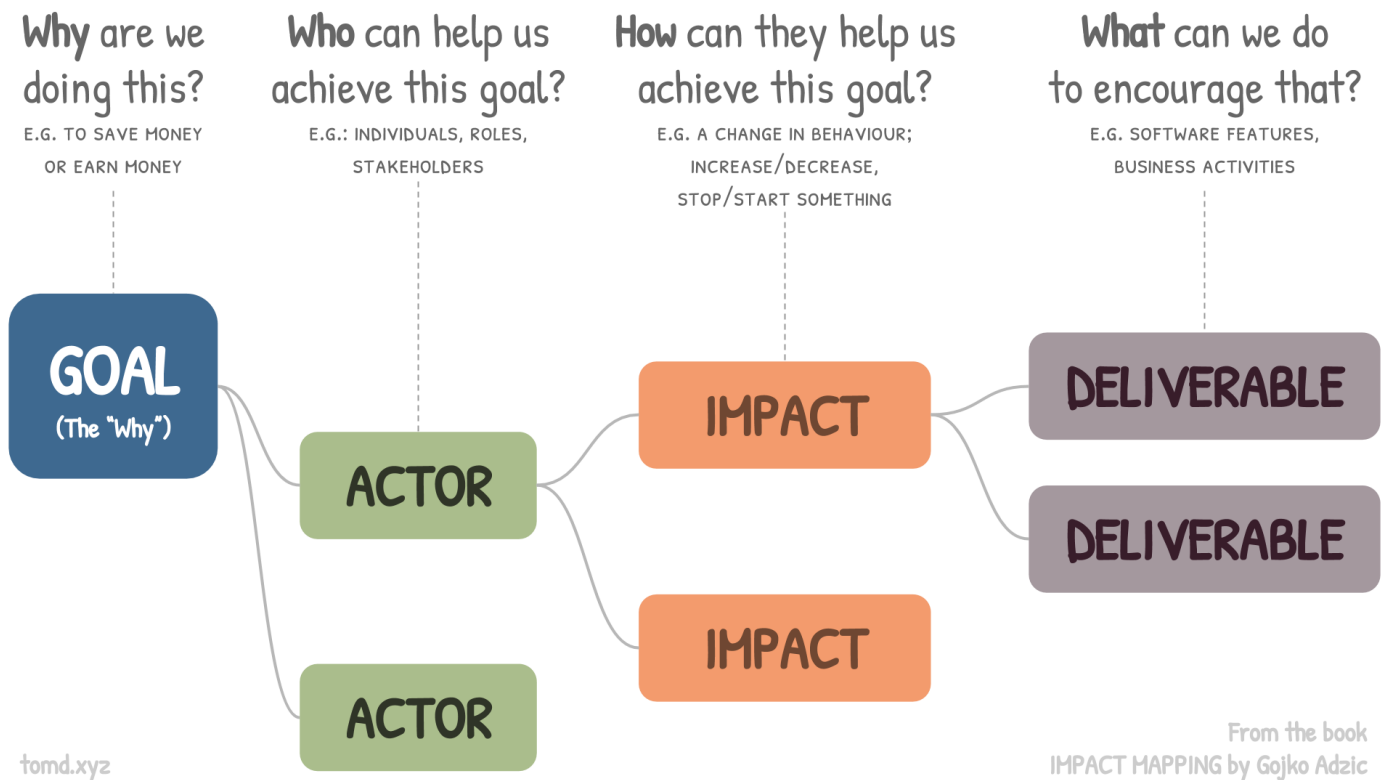


Figure 1 - Overview of the Impact Mapping process

Step 1 – Why are we doing this? This is the **goal** we are trying to achieve. It might sound like common sense to know this upfront, but very few people working on delivery know the expected objectives. These are sometimes drafted in a vision document, but more frequently exist only at the back of senior stakeholders’ minds. Even when they are communicated, goals are often defined in vague terms. Knowing why we are doing something is the key to making good decisions about cost, scope and timelines, both at the start and later when things change. Research shows that people on the ground must know the objectives of any activity in order to react correctly to unforeseen problems. And unforeseen problems are a fact of life in any but the most trivial software. If a product milestone or project succeeds in delivering the expected business goal, it is a success from a business perspective, even if the delivered scope ends up being different from what was originally envisaged. On the other hand, if it delivers exactly the requested scope but misses the business goal, it is a failure. This is true although delivery teams can blame customers for not knowing what they want. **By having the answer to ‘WHY?’ in the centre, impact maps ensure that everyone knows why they are doing something. That helps teams align their activities better, identify true requirements and design better solutions.**



Step 2 – Who can produce the desired effect? Who can obstruct it? Who are the consumers or users of our product? Who will be impacted by it? These are the **actors** who can influence the outcome. Gerald Weinberg defined quality as “value delivered to some person”. To deliver high-quality results, we first must understand who these people are, and what kind of value they are looking for from our products or project outcomes. In addition to those directly getting value out of our software, we also must consider a host of others who can make decisions that influence the success of a product milestone or the outcome of a project. Software does not work in a vacuum and it rarely controls all the actors who are involved with it. People have their own needs, goals and preferences, which all come into play if we truly care about achieving a business goal instead of just delivering software. Yet most requirements’ models completely ignore this – they focus on what the software should do and not who will benefit from it and who will be worse off when it is delivered. Then somewhere mid-work, a new actor appears from nowhere and everything changes fundamentally, or someone with sufficient decision-making influence just stops the delivery in its tracks. Impact maps make us think about all these decision-makers, user groups and customer segments. **By mapping out different actors, we can prioritise work better – for example focusing on satisfying the most important actors first.**

Step 3 – How should our actors’ behaviour change? How can they help us to achieve the goal? How can they obstruct or prevent us from succeeding? These are the **impacts** that we are trying to create. A key to successful delivery is to understand what jobs customers want to get done instead of their ideas about a product or service. This helps delivery organisations investigate different technical options and explore solutions to produce good results. It also helps to focus delivery on supporting users in getting the job done instead of just delivering features. By listing **impacts** on the second level of a map, we consider the desired changes in the behaviour of actors. This leads to better plans and helps with prioritisation. Different actors could help us or obstruct us in many ways on our route to achieving the key business objectives. Some of the impacts will be competing, some conflicting, some complementary. We do not necessarily have to support all of them, but without considering delivery scope in the context of these activities, it is very challenging to prioritise and compare deliverables. **The hierarchical nature of the map clearly shows who creates an impact and how that contributes to the goal. This clear visualisation allows us to decide which impacts best contribute to the goal and identify the risks; this helps immensely with prioritisation.**

Step 4 – What can we do, as an organisation or a delivery team, to support the required impacts? These are the deliverables, software **features** and organisational activities. Delivery plans and requirements documents are often shopping lists of features, without any context that explains why such things are important. Without a clear mapping of deliverables to business objectives, and a justification of that mapping through impacts that need to be supported, it is incredibly difficult to argue about making or not making an investment in certain items. In larger organisations with many stakeholders or product sponsors, this leads to huge scope creep as everyone’s pet features and ideas are bundled in. No wonder such plans often fail. An impact map puts all the deliverables in the context of the impacts that they are supposed to support. This helps with breaking deliverables down into independent chunks that provide clear business value and help us launch something valuable sooner. A clear hierarchy allows us to group related deliverables, compare them and avoid overinvesting in less important actors or impacts. It also helps us to throw out deliverables that do not really contribute to any important impact for a goal. **Finally, by connecting deliverables to impacts and goals, a map shows the chain of reasoning that led to a feature suggestion, visualising the assumptions of stakeholders. This allows us to scrutinise those decisions better and re-evaluate them as new information becomes available through delivery.**

3.1.1

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Creating a training of teachers programme dedicated to computational thinking



1. Develop the programming skills of teachers to benefit fully from the advantages of digital solutions in the classroom
2. Enhance interdisciplinarity and creativity in the learning process by developing computational thinking approach for teachers
3. Provide best practices and examples of innovative pedagogies in teaching STEAM at secondary schools

