

THE ASSESS



21

HANDBOOK



INNOVATIVE DIGITAL SOLUTIONS TO ASSESS 21ST CENTURY SKILLS IN MAKERSPACES

**INNOVATIVE DIGITAL SOLUTIONS TO ASSESS
21ST CENTURY SKILLS IN MAKERSPACES**

ASSESSMAKE21 HANDBOOK

TRAINING MATERIAL DEVELOPMENT (IO3)

Lead Partner: EDUMOTIVA

Authors:

Rene Alimisi [EDUMOTIVA], Yiannis Berdousis [EDUMOTIVA],

Chrissa Papasarantou [EDUMOTIVA]

Contributors:

Cyprus Interaction Lab (CIL), Learnovate, DCU, Karlstad University

Declaration

This report has been prepared in the context of the ASSESSMAKE21 project. Where other published and unpublished source materials have been used, these have been acknowledged.

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TABLE OF CONTENTS



About this handbook

Instead of an introduction

Getting started with the *AssessMake21* tool

Inspiring projects

Further reading





ABOUT THIS HANDBOOK





ABOUT THIS HANDBOOK

Welcome to the ASSESSMAKE21 Handbook! Our goal is to help guide and inspire you in using the Assessmake21 tool in your making context. Whether active in a non- formal makerspace or in an in-school makerspace we hope these pages can be a catalyst for your learning interventions with the ASSESSMAKE21 tool, your explorations of making practices with your students, and further reading.

The handbook is designed for secondary school teachers engaged with makerspaces and non-formal educators and facilitators working in makerspaces. The aim of the handbook is to present a set of training materials that can support teachers in applying the Assessmake21 learning intervention and using the Assessmake21 tool in their making contexts.

The Assessmake21 learning intervention is a response to the question frequently raised by teachers, educators, facilitators that work in makerspaces: “ In an open-ended environment, as this of a makerspace, where students create unique solution paths to problems, interact with peers, change roles, use a variety of tools and materials and act in both the physical and digital world... how can I assess the skills that they develop?”

The handbook includes 4 sections that cover theoretical and practical aspects. Here is a brief description of the contents of each section:

Section 1 Instead of an Introduction	The 1st section presents in an easy to grasp way the theoretical framework underpinning the Assessmake21 project. In this section you can find information about makerspaces and maker activities. The making practices are also seen under the prism of 21st C Skills. Finally this section highlights the need for tools to assess the aforementioned skills.
Section 2 Getting started with the AssessMake21 app	The 2nd section is an introduction to the Assessmake21 digital tool/solution, how to use tutorial and guidelines, and learning scenarios that will exemplify the use of the tool/solution in makerspace settings.
Section 3 Inspiring projects	The 3rd section aims at inspiring teachers by presenting a list of maker activities/projects that have been carried out by young makers. The session closes with an invitation for contribution: what about showcasing your students' project in the handbook?
Section 4 Further reading	Here you can find useful resources for further reading. These target teachers interested in going deeper into the theoretical concepts presented in the 1st section. They cover a range of topics: maker education, maker movement, making projects, 21st century skills and more. Here you can also find extended texts that aim at further explaining the theoretical issues raised in the beginning of this handbook.



Theoretical parts are enhanced with tasks, guidelines, authentic experiences from makerspace representatives, scenarios that demonstrate real practice, illustration and videos.

Specific icons are used to better describe the different types of content included in this handbook. These icons appear below:



Reflective-discussion tasks:
tasks that requires reflection
and exchange of ideas



Guidelines:
icon that highlights pages
with guidelines for the
Assessmake21 tool



Action tasks:
tasks performed with the
Assessmake21 tool



Theoretical part:
icon that highlights pages
with theoretical part



video:
icon for videos



Making projects:
icon for maker activities/
projects



Writing tasks:
icon that indicates an area
for keeping notes



About:
brief information about this
handbook

It is recommended to go through the following sections (especially section 3) before using the Assessmake21 tool with your students. As you go through, try to imagine what would work in your makerspace context. A number of scenarios are available for you that showcase how the tool can be used, what challenges a teacher may face and what your students may experience.

Note: This handbook is being updated regularly to better accommodate teachers and educators' needs. In our effort to continually improve the material, we highly encourage you to contact us with anything we can refine, add or share.

We will be happy to review your suggestions and comments. Please address them to info@assessmake21.eu

INSTEAD OF AN INTRODUCTION

1

About Makerspaces

What a makerspace is
What makes a good makerspace
Maker Movement Manifesto
“Do It Yourself” and “Do It Together”

What makers can do

A quick glimpse to th 21st century skills

Collaboration
Creativity
Problem Solving
Life/ Social skills
Communication

In the need for assessment



WHAT A MAKERSPACE IS

“One trend in particular gets a lot of attention at the moment – in both branches: Innovation spaces with digital tool support, so-called makerspaces or fablabs (fabrication laboratories). These spaces and rooms for digital do-it-yourself tend to be a trending buzz. But I also see them as a promising development for learning and innovation. Creativity and innovation need space, tools and time. And by offering just that, fablabs and maker education have the potential to re-invent learning, too”.

*Interview with Sandra Schön, retrieved online from:
<https://www.feedbackr.io/2017/05/23/interview-sandra-schoen/>*



Maker spaces could be perceived as efforts towards the spatialization of the principal ideas behind **Maker Movement**. Maker spaces – or FabLabs – were introduced in education during early 2000s due to emerging needs of turning teaching and learning processes into more experiential and real-world problem-solving based activities, while the basic concepts behind these infrastructures (i.e., making and digital fabrication), are based on “**three theoretical and pedagogical pillars**: experiential education, constructionism, and critical pedagogy” (Blikstein 2013: 4).

“Maker spaces are community-oriented workshops that engage learners in problem-solving through hands-on design and construction, oftentimes combining analog material with digital tools”

*Stefanie Panke, 2016, retrieved online from
<https://www.aace.org/review/make-a-maker/>*

Maker spaces promote among others the **DIY culture** and innovation, the **tinkering spirit** and the hands-on approaches paving the way to the production of more influencing educational methods regarding teaching and learning (Schon et al 2014: 86), while the activities hosted therein are oriented towards a more **free-form and interdisciplinary** way of learning driven by students' cognitive, technical and social-emotional skills (Grandl et al 2018: 407). Noteworthy, there is a **strong social aspect** around maker spaces. They are often described as gathering points of novices and experienced makers to work on real, relevant and personally meaningful projects, using new technologies and traditional tools, under the discrete guidance of mentors and experts.



§ FURTHER READING



TASK 1

WHAT MAKES A GOOD MAKERSPACE



What are the ingredients of a good maker space?
If you were to create and equip a new maker space for a school or library, how would your ideal solution look like?

“I would start by asking the children what they wanted to do in a maker space and how to get started. Ideally, we would travel to fablabs and a maker faire and visit other schools with maker spaces. As a teacher, I would collect and sort all kinds of stuff – waste, tools and random free. Add in free Wi-Fi and some computers, wood and a power screwdriver, and you are off to a good start. And of course I would share ideas with people from the MakerEd scene. I would build a lot myself and also let the children build parts of the environment. In the end, that’s what making is all about!”

*Sandra Schon, retrieved online:
<https://www.aace.org/review/make-a-maker/>*

The quote presented above questioning while igniting possible conversation regarding makerspaces and the proper conditions that can lead to the creation of a good makerspace. Reflect upon your experience: If you were to give few tips to a fellow teacher/educator interested in creating a makerspace, what will these be?

Write here your thoughts



(link to google form <https://forms.gle/ipc6mrgEcrhBiANBA>)

§ FURTHER READING



TASK 2

MAKER MOVEMENT MANIFESTO

ENGRAVE | The Maker's Market

M A N I F E S T O
for

MAKERS

Make

Making is fundamental to what it means to be human. We must make, create, and express ourselves to feel whole. There is something unique about making physical things. These things are like little pieces of us and seem to embody portions of our souls.

Share

Sharing what you have made and what you know about making with others is the method by which a maker's feeling of wholeness is achieved. You cannot make and not share.

Give

There are few things more selfless and satisfying than giving away something you have made. The act of making puts a small piece of you in the object. Giving that to someone else is like giving someone a small piece of yourself. Such things are often the most cherished items we possess.

Learn

You must learn to make. You must always seek to learn more about your making. You may become a journeyman or master craftsman, but you will still learn, want to learn, and push yourself to learn new techniques, materials, and processes. Building a lifelong learning path ensures a rich and rewarding making life and, importantly, enables one to share.

Tool up

You must have access to the right tools for the project at hand. Invest in and develop local access to the tools you need to do the making you want to do. The tools of making have never been cheaper, easier to use, or more powerful.

Play

Be playful with what you are making, and you will be surprised, excited, and proud of what you discover.

Participate

Join the Maker Movement and reach out to those around you who are discovering the joy of making. Hold seminars, parties, events, maker days, fairs, expos, classes, and dinners with and for the other makers in your community.

Support

This is a movement, and it requires emotional, intellectual, financial, political, and institutional support. The best hope for improving the world is us, and we are responsible for making a better future.

Change

Embrace the change that will naturally occur as you go through your maker journey. Since making is fundamental to what it means to be human, you will become a more complete version of you as you make.



www.engage.in

From The Maker Movement Manifesto by Mark Hatch

Maker Movement manifesto brings together nine principles, namely Make, Share, Learn, Tool Up, Play, Participate, Support and Change, which all relate with the making process (Hatch in Schon et al 2014). In short, it is implied that it is through making that someone can learn, discover, improve her/his world, become social, share and ultimately express her/himself.

At your left hand side you can see the poster of the maker movement manifesto.

How these 9 principles are applied in your makerspace?

Did you face any difficulty applying these principles?

Please share your experiences here (link to google form <https://forms.gle/2QTpMM4GDiJrsXEZ6>)



§ FURTHER READING



TASK 3

“DO IT YOURSELF” AND “DO IT TOGETHER”

In recent years, a lot of research has been carried out on how makerspaces function as learning environments in formal and informal educational contexts. Makerspaces embrace the Do IT Yourself culture which is a vital aspect of making. But Do It Together is also a significant aspect that sometimes is not sufficiently boosted.



The Do It Together culture does not mean forcing the students to work together though. It neither means pushing everyone to do the same maker activity/ project. Teamwork is highly valued but it is equally important to ensure that the students decide are engaged in meaningful projects that reflect their personal interests and preferences; and it is this personal engagement that brings them authentically closer to fellow makers and connects them to the making community.

How can the “Do It Together” culture be meaningfully enhanced in your makerspace context?

Document your thoughts here (link to google form <https://forms.gle/Bfy6jEYF6NHPLYis9>)



§ FURTHER READING

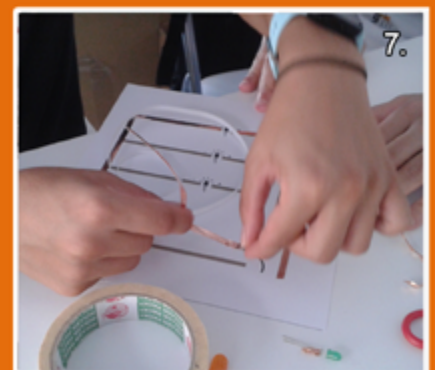
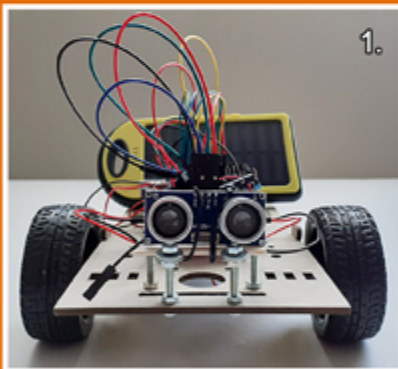


WHAT MAKERS CAN DO

“I was surprised to see that after 6 months of practice in the makerspace the students came up with many creative artefacts and ideas of even more. With little support in the beginning they started developing their own ideas using everyday materials and the available tools in the makerspace”.

Facilitator A in the eCraft2Learn makerspace in Athens, Greece

Below we present making projects that were carried out by young makers resulting in the creation of creative digital and physical artefacts. The projects showcase thoughtful educational practice and student centered learning with modern materials. The projects vary in complexity and duration, are free-form, capturing the essential heart and soul of the project instead of trying to fit them into a one-size fits-all “lesson plan” template. In a few cases the idea for the project emerged after the discussion with the educator but this was adapted to students’ interests or extended by them. The project snapshots that appear below accommodate a wide variety of grades and experience levels, vary in length and expertise needed, and use many different tools, materials, software, and hardware.



1. THE DIY AUTOMOBILE 2. THE LIGHTHOUSE 3. THE SUNFLOWER 4. THE 3D PRINTED PEN HOLDER
5. THE SMART LIGHT 6. THE ALARM SYSTEM 7. INTERACTIVE PAPER MODELS

§ Explore more in section 4 and find out how you can contribute to this handbook showcasing your students’ work.



A QUICK GLIMPSE TO THE 21ST CENTURY SKILLS

21st century skills are considered the essential skill set necessary in the workplace of the 21st century. These skills go beyond Critical Thinking and Problem Solving including Citizenship, Collaboration, Communication, Creativity, Global Awareness, ICT literacy, Personal and Social Responsibility, and Problem Solving. Five of the most often identified 21st century skills in the context of makerspaces (either in schools or nonformal) as identified by teachers and/or makerspace facilitators are Collaboration, Creativity, Problem Solving, Social skills and Communication. These in-demand skill sets help to develop young minds for future success and makerspaces foster the development of those skills.

Collaboration



Collaboration is the essence of most parts of activities in these spaces, and the exchange of information is the way to learning. To create a project, it is necessary to discuss possibilities and obstacles, to share ideas, to manage the time, and functions of the team. You have to create frameworks through which the information can be distributed, either within teams or even across the makerspace.

Creativity



Makerspaces foster creativity and innovation through hands-on experimentation. Students have the opportunity to be creative and apply personalized learning strategies to make changes to existing concepts or develop their own ideas, methods or products. Makerspaces are designed to challenge students to create and learn through hands-on, personalized experiences throughout school years. Hands-on learning activities allow students to move from an abstract concept to a real-world understanding practicing on creating solutions to real-world problems.





A QUICK GLIMPSE TO THE 21ST CENTURY SKILLS

Problem Solving



Problem solving is included in the design of the maker activities. Students follow a series of steps to discover learning by themselves. They explore, search, investigate, find evidence, and solve the problem using the design process in all the artefacts. They come up with ideas, they plan their solution identifying the tools and materials needed in each case, they are experimented. Experimentation, testing, evaluating and modifying are part of the process. Students learn how to make failure into a learning experience and not become discouraged or frustrated when something does not go as planned.

Life/Social Skills



The combination of having complex situations in your personal life along with stressful working environments builds the need for the development and growth of skills that are beyond content and thinking skills. In a making environment learners need to adapt to a number of roles, job responsibilities, schedules and contexts. They have to set and try to meet goals with tangible and intangible success criteria and balance short-terms and long-term goals. They need to utilise time and manage workload efficiently, inspiring others and “...gaining extra skills while being comfortable in the strengths that they have”.



Communication



Communication is included in the interpersonal skills, along with social skills, teamwork, cultural sensitivity, and diversity. In a making environment learners communicate with their peers when building the project as well as address the facilitator or turn to the person next to them and communicate with them. They are engaged in dialogues, express opinions, speculate, discuss, reason, and engage in debate and argument.

§ FURTHER READING



TASK 4

RECOGNIZING THE SKILLS

Below you can see quotes of young makers. These were collected after 6 months of practice in a makerspace in Athens (Greece). The young makers (aged 13-17 years old) reflect upon their making experiences. Go through the following statements.

Can you relate students' statements to specific skills?



'What I liked the most is that we made things with our own hands and we could support it as our own construction, our own work. You do something for several weeks and at the end you have the pleasure to support it as your own work... We had the freedom to express and reflect our own ideas and did it our own way'.

Young maker A, 15 years old

In the beginning each of us expressed ideas on how we imagined the artefact. In the end we found the golden ratio and we started working on the end-product. We decided to create a small robot (automobile) that can move with the use of solar energy, and avoid any obstacle that comes across its path. In regard to a conversation we had, on what each of us preferred and wanted to do, we separated the work and we adjusted our needs to the discussed work-plan. In the beginning we had some issues due to lack of self-discipline but after a while we tackled these problems, we worked a lot and I think that in the end we were all satisfied with the result.

Young maker B, 14 years old



I think that I have optimized the way that I am doing things. My thoughts are more concrete and organized and I have become better on planning my project and finding the best solution to make it work properly. On programming I already had some expertise but now I have also learnt how to be good in tasks related to modelling and crafting and also to tackling problems and issues.

Young maker C, 16 years old

Our initial plan was for all of us to involve equally in programming but after a while we realized that this would not be very practical and besides it would be very time consuming. Therefore we decided to divide the tasks and to split. So we all did part of the programming and crafting but we were not involved equally in these tasks. Some did more programming than the others; some more crafting than the others. We also had the help of our coach, Ms X, but the outcome was the result of good collaboration.

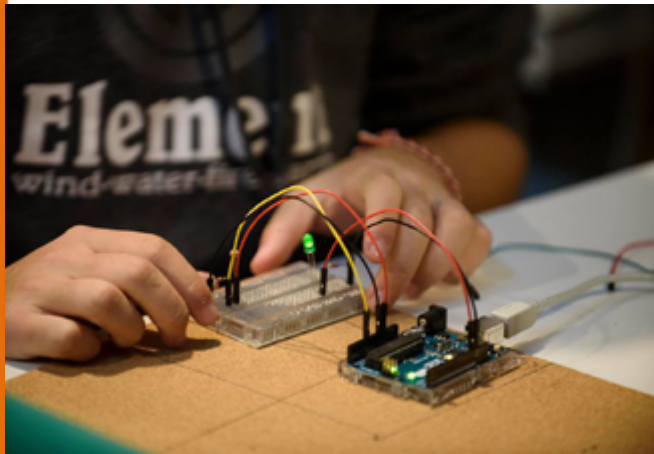
Young maker D, 14 years old



IN THE NEED FOR ASSESSMENT

“There were at least 4 different making projects on in the makerspace at that time, digital and physical activity at the same time, individual and group work, role interchange, problems, failures, excitement and progress...it was almost impossible to evaluate what was going on and students’ reflection on their skill-building”

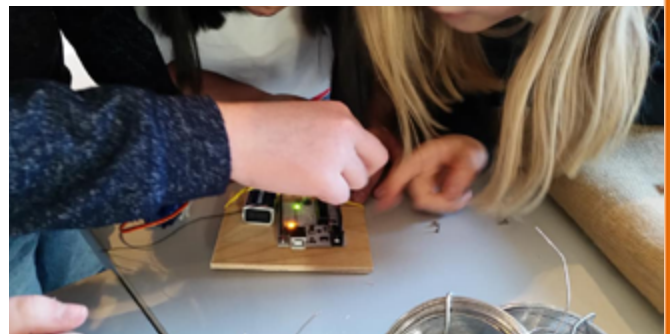
Facilitator B in the eCraft2Learn makerspace, Athens, 2018



Assessing student learning is critical because it can demonstrate whether educational activities are meeting their educational goals and its results may affect decisions about instructional needs and interventions. While standardized testing has dominated the assessment process in a traditional pedagogical framework, a makerspace is looking beyond statewide assessments to broader definitions and measures of student achievement, **focusing on boosting 21st century skills**. Teachers are rethinking assessment techniques looking to gauge student learning in real-time. But how can they recognize students’ progress in developing 21st century skills and how they can support them?

Unlike the learning outcomes that are traditionally measured employing standardized tests, assessment of these higher order skills is not easy, particularly within the open-ended environments where students create unique solution paths to problems, interact with peers, and act in both the physical and digital worlds. In fact, teachers need to look beyond traditional assessment in order to include more innovative techniques to measure students’ achievement. They need to have access to valid and reliable assessment instruments to recognize and support students as they develop these skills (Lai & Viering 2012).

Some teachers in a makerspace may seek to use rubrics to measure learning and development of skills beyond academic content knowledge; others may use (digital) portfolios to collect ongoing evidence of student learning. Yet, they all need support to collect data through the use of a (digital) tool that can provide useful and valuable insights so as to help them make evidence-based decisions to improve student learning and development of 21st century skills providing the necessary feedback.



TASK

Discuss/Think: What techniques do you employ to assess the development of those soft skills in a makerspace?

§ FURTHER READING



IN THE NEED FOR ASSESSMENT

Digital technologies can offer novel methods and solutions to assess 21st century skills supporting teachers and educators in gaining insights to learners' efforts and achievements.

The **Assessmake21 tool** is a digital solution, specific to the needs of makerspaces, to **assess 21st century skills** for teachers and students. This tool is expected to promote more effective learning in makerspaces by enhancing the understanding of learners, their needs and the impact of learning interventions.

The assessment methods employed aim to improve the scalability of the maker movement in education since they may not only reveal students' skills developed throughout specific learning activities, but they could also help researchers and teachers/ educators design better curricula, pedagogical approaches, and learning resources for makerspaces in schools and nonformal centres.

Before getting started with the Assessmake21 tool, you can click the link below to find a video featuring the Assessmake21 tool overall



https://www.youtube.com/watch?v=EY4g62_yI-Q

GETTING STARTED WITH THE ASSESSMAKE21 TOOL

2

Educator's dashboard

- Entering the educator's dashboard
- Create a classroom
- A closer look at the three approaches
- A closer look at levels
- Monitoring classroom progress

Students' dashboard

- Login with credentials
- Towards recognizing and assessing
- Overview of the My Portfolio
- Overview of My Badges
- Overview of Examples
- Overview of Definitions



Educator's dashboard

This section includes information regarding the Educator's dashboard. Here you can find step-by-step guidelines for entering to the application and setting up a classroom, detailed explanation regarding the different approaches and the different levels coupled with implementation scenarios, as well as a number of pedagogical tips.



ENTERING THE EDUCATOR'S DASHBOARD

To enter the Educator's Dashboard, you need to insert your email and your password **(1)** to the corresponding fields, and press login **(2)**.



**ASSESS
MAKE 21**
Educator's Dashboard

1

Email

Password

2

Login

Don't have an account? [Sign up](#)

<https://educator.assessmake21.eu>

Click here to find a video with step-by-step guidelines on how the educator's dashboard works:



<https://www.youtube.com/watch?v=51VplyxfffY>



CREATE A CLASSROOM



To set up a new classroom click/tap on + Create a new classroom on the homepage of the Assessmake21 Educator's Dashboard menu

ASSESSMAKE21
Educator's Dashboard

Home

+ Create a new classroom

Test class

Experimental classroom

Experimental classroom

Summer Class

Summer Class

SuperClass

Frouuuu

Dashboard

Welcome back, Edumotiva!

Manage your classrooms and get an insight of the development for the 21st century skills of your students.

My Classrooms



Test class
1 student



Experimental classroom
4 students



Experimental classroom
4 students

The first step towards creating a new classroom is to register your students. You can either insert manually the names of your student to the corresponding field (1), or you can import a csv file (2) containing a list with all the students that you want to be registered for this class. You can remove a student by clicking/tapping on the X mark, on the right side of each name. Once you finished with the registration, click/tap on the next button (3) to continue the setting up process.

ASSESSMAKE21
Educator's Dashboard

Create a new classroom

< Back

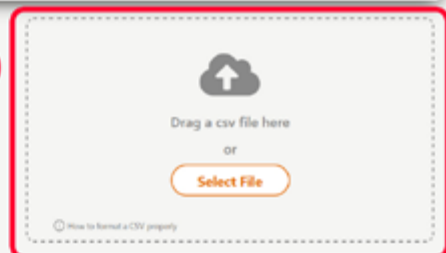
Add students

Register your students here by either pasting a list with their names or upload a csv document. Let us do the rest!

1

Alex D.	X
Sara L.	X
Phillipe G.	X
Maria S.	X
Jon Doe...	X

2



OR

Cancel

Next

3



CREATE A CLASSROOM

The next step is to choose an approach that you want to adopt for your classroom. You can select among three choices, namely the “Parallel Approach” **(1)**, the “Parallel tapping/ Challenges at the end” **(2)** or the “At the end Approach” **(3)**. Click/tap on the corresponding tab and press next **(4)** to continue.


ASSESSMAKE21
Educator's Dashboard

- Home
- + Create a new classroom
- Test class
- Experimental classroom
- Experimental classroom
- Summer Class
- Summer Class
- SuperClass
- Frouuuu
- Test 2
- Dream Class
- TEST-2


Choose approach

< Back

Approaches
You know your students better than us! Choose which approach of this tool you would like to adopt for your classroom




Parallel Approach **(1)**




Students input what skills they think they are using and complete activities during the maker session

Parallel tapping / challenges at the end **(2)**



Students input what skills they think they are using during the maker session and complete activities at the end of the classroom

At the end Approach **(3)**



Students at the end of the classroom rate on a scale which skills they think they were using during their maker sessions. Then take a series of activities based on their input

(4)

Cancel Next

Then you need to set the duration of your classroom, namely the number of activities that your student needs to complete to progress to the next level. You can choose among three different durations: the Short Duration **(1)**, the Medium Duration **(2)** or the Long Duration **(3)**. After clicking/tapping on the corresponding tab, press Next **(4)** to move on with the procedure.


ASSESSMAKE21
Educator's Dashboard

- Home
- + Create a new classroom
- Test class
- Experimental classroom
- Experimental classroom
- Summer Class
- Summer Class
- SuperClass
- Frouuuu
- Test 2
- Dream Class
- TEST-2

Choose duration


< Back

Duration
Choose how many activities students should complete to progress to the next level, based on the number and duration for your making activities in the classroom.




**By all means, a student can further develop and reflect on the tool much faster than his/her peers.*

Short Duration **(1)**
Max. 2x00' lessons




For each level: 5 Activities 4 Challenges + 1 Visual Example

Medium Duration **(2)**
Max. 3x00' lessons



For each level: 8 Activities 6 Challenges + 2 Visual Example

Long Duration **(3)**
Max. 4x00' lessons



For each level: 12 Activities 8 Challenges + 4 Visual Example

(4)

Cancel Next



CREATE A CLASSROOM

The next step is to set the language of your classroom. Currently, you can choose among English (1), Swedish (2) and Greek (3). Click/tap on the corresponding tab and press Next (4).

ASSESSMAKE21
Educator's Dashboard

Home
+ Create a new classroom
Test class
Experimental classroom
Experimental classroom
Summer Class
Summer Class
SuperClass
Frouuuu
Test 2
Dream Class
TEST-2

Choose language
< Back

Language
Choose your classroom's language.

English 1

Swedish 2

Greek 3

Cancel Next 4

On the Final Details board you can have an overview of the selections you have done so far (i.e., the duration, the approach and the technologies you have set) and change anything you want by clicking/tapping the corresponding indication (1), while you can type the name of your classroom (2). After finishing, click/tap on the Next button (3) to move forward with the process.

ASSESSMAKE21
Educator's Dashboard

Home
+ Create a new classroom
Test class
Experimental classroom
Experimental classroom
Summer Class
Summer Class
SuperClass
Frouuuu
Test 2
Dream Class
TEST-2

Final Details
< Back

Almost there!
Name your classroom and make sure that all the classroom options are correct.

Technologies
Fabrication
3D printer
3D pen
Cric Router
Micro-processors
Raspberry Pi
Micro-bit
Other
Computer

Short Duration
For each level: 5 Activities 4 Challenges + 1 Visual Example

Parallel Approach
Students input what skills they think they are using and complete activities during the maker session.

Classroom Name
Best Class Ever

Change 1

Change 1

Change 1

Cancel Next 3

Logout



CREATE A CLASSROOM

The final step is the Login Credentials. Here you can find a unique code for each one of your students (1), automatically generated by the application. You can either save them as a pdf document, or you can click/tap on the Print Login Credentials (2) and print them. Send to each one of your students her/his code (e.g., Alex D. has the code 3-N-D-K-7-8) to enable them to have access to your classroom, through the Student's dashboard. After printing or saving the credentials, press Done (3) to finish setting up your classroom.

ASSESSMAKE21
Educator's Dashboard

Home
Create a new classroom
Test class
Experimental classroom
Experimental classroom
Summer Class
Summer Class
SuperClass
Proxima
Test 2
Dream Class
TEST-2
Best Class Ever

Login Credentials

< Back

Login Credentials
We have generated a unique login code for each student. This is the only login credential that students will need. You can print them whenever you need.

Alex D.	3-N-D-K-7-8 X	Sara L.	2-A-Y-U-5-L X
Phillipe G.	W-C-1-W-M-U X	Maria S.	P-Q-S-3-O-6 X

Print Login Credentials

Done

You can find all the classes you have created in the homepage of Educator's dashboard.

ASSESSMAKE21
Educator's Dashboard

Home
Create a new classroom
Test class
Experimental classroom
Experimental classroom
Summer Class
Summer Class
SuperClass
Proxima
Test 2
Dream Class
TEST-2
Best Class Ever

Dashboard

Welcome back, Edumetiva!
Manage your classrooms and get an insight of the development for the 21st century skills of your students.

My Classrooms

Test class 1 student	Experimental classroom 4 students	Experimental classroom 4 students
Summer Class 3 students	Summer Class 3 students	SuperClass 2 students
Proxima 1 student	Test 2 3 students	Dream Class 1 student
TEST-2 2 students	Best Class Ever 4 students	

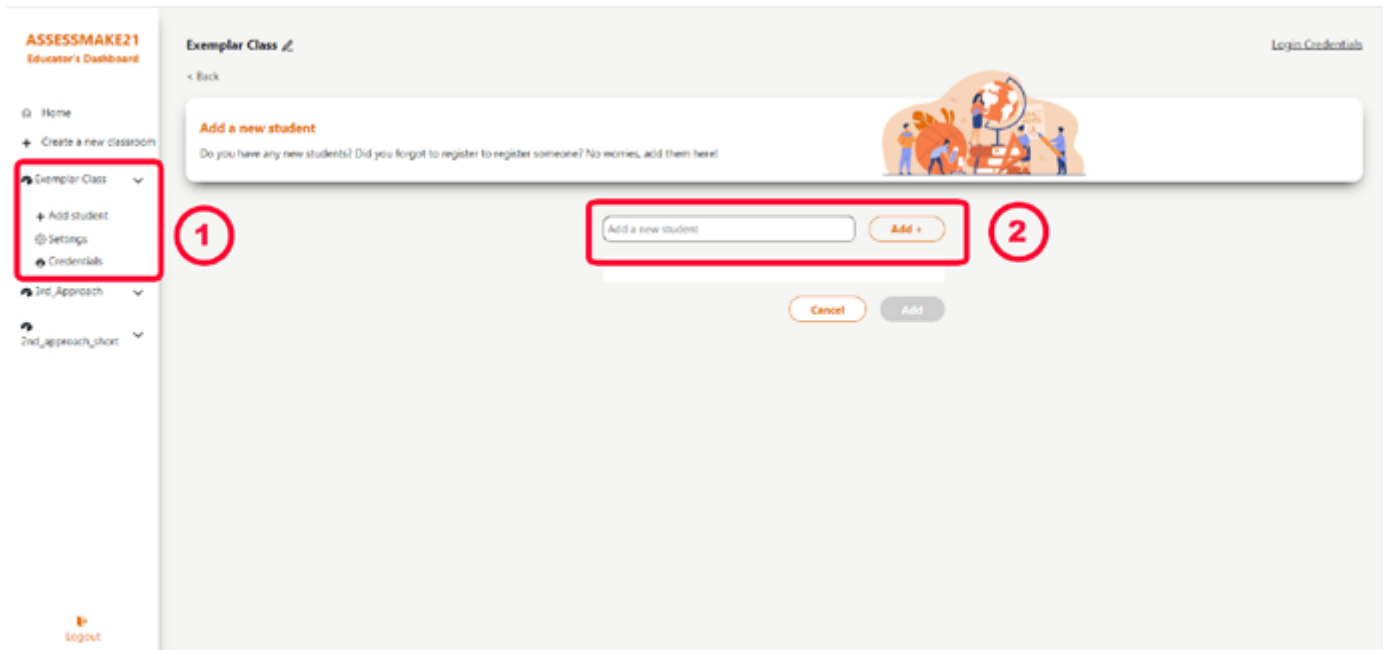
Login



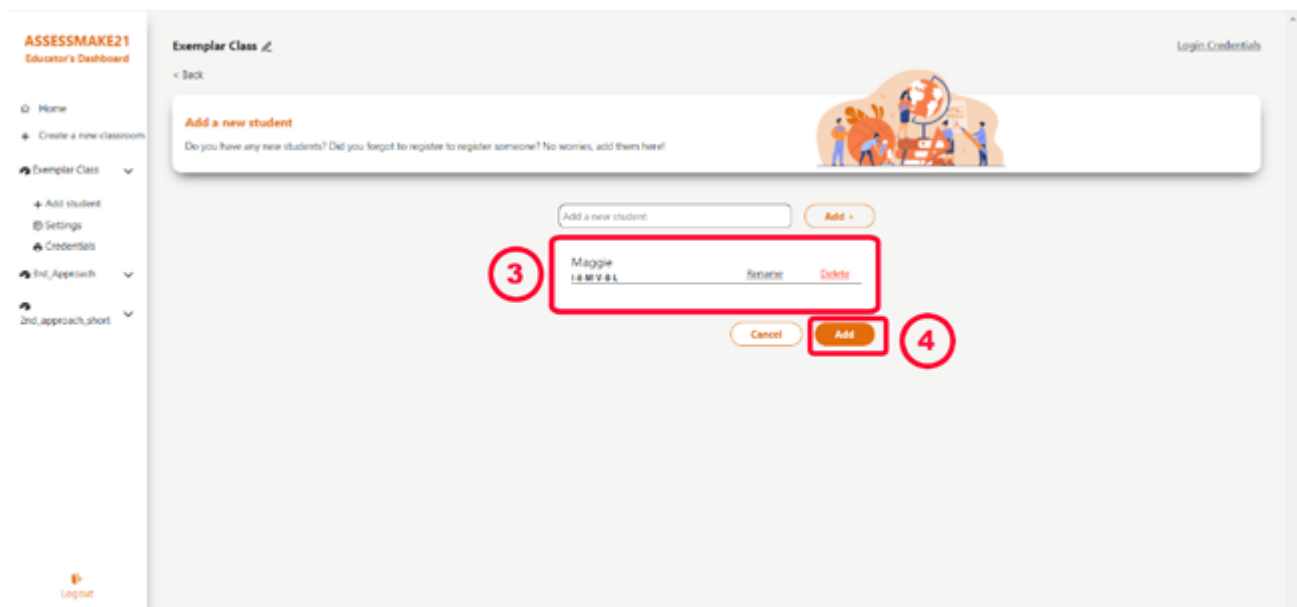
CREATE A CLASSROOM

REGISTERING NEW STUDENTS

To add/register one or more students to an existing classroom - in case you need to - select the created classroom on the Home menu (1) and tap on the “+Add student” selection. Then, type the name of your student on the text field “Add a new student”, and press Add+ (2).



After tapping on the Add+ button, the added name (Maggie in the example) with the corresponding credentials appears under the text field (3). Tap on the Add button (4) to verify the new registration, or tap on Rename in case you need to make any modifications. Tapping on Delete will erase the new registration and the corresponding credentials.

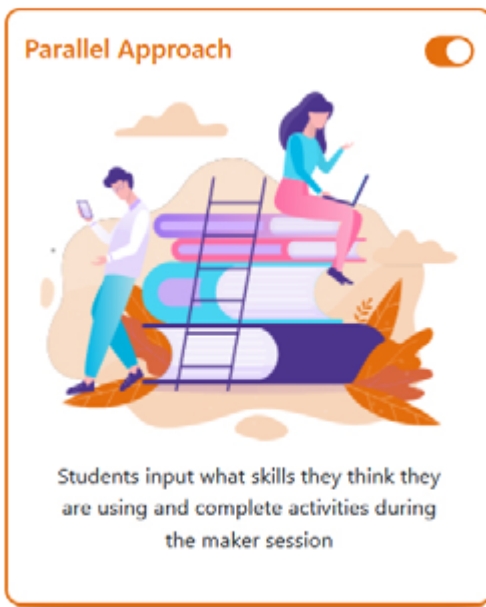




A CLOSER LOOK AT THE 3 APPROACH CARDS

The educators and makerspace facilitators have different styles and approaches when it comes to engaging students in making activities and reflective tasks around the development of 21st century skills. Thereby three (3) different approaches are available and you are free to select what better suits your classroom/group of students based on emerging needs and existing constraints.

FIRST APPROACH (PARALLEL APPROACH)



THE STUDENTS INPUT WHAT SKILLS THEY ARE USING AND COMPLETE ACTIVITIES DURING THE MAKER SESSIONS

SCENARIO

Anna is an educator in a non-formal makerspace which enrolls 15 students. The makerspace is open daily after school hours from 16:00 to 20:00 and from 10:00 to 14:00 on Saturdays. The students visit the makerspace to implement their projects in their free time. Usually they work in groups or pairs. Anna estimates that the students spend an average of 3 hours in their making projects on a weekly basis. Given that there are not any time constraints to take into account, Anna activates the parallel approach and encourages her students to use the Assessmake21 tool during the maker sessions.



A CLOSER LOOK AT THE 3 APPROACH CARDS

SECOND APPROACH (PARALLEL TAPPING / ACTIVITIES AT THE END)



THE STUDENTS INPUT WHAT SKILLS THEY ARE USING DURING THE MAKING SESSIONS AND HAVE THEM COMPLETE ACTIVITIES ONLY AT THE END (BASED ON WHAT THEIR INPUT THE ENTIRE TIME IN CLASSROOM)

SCENARIO

George is a teacher in a secondary school and in charge of the school's makerspace. This year, the school has launched a Creative Zone, a 2-hours slot twice a week, into which the students voluntarily visit the makerspace to implement creative projects with the available making tools. The makerspace is being visited by approximately 50 students on a weekly basis. The thematic area of the projects is up to students' preferences. George makes sure that within the available time, the students progress with their projects. He also makes an attempt to bring forward the different STEAM-related disciplines inherent in their work. The Assessmake21 tool helps George monitoring what is going on in the makerspace in terms of 21st century skill development. He has activated the 2nd approach as he thinks that having the activities in the end does not obstruct the making spirit.



A CLOSER LOOK AT THE 3 APPROACH CARDS

THIRD APPROACH (AT THE END)



THE STUDENTS RATE AT THE END OF THE MAKER SESSION WHICH SKILLS AND TO WHAT EXTENT THEY WERE PRACTICED DURING THE MAKING ACTIVITIES AND PRESENT ACTIVITIES BASED ON THEIR INPUT AT THE END.

SCENARIO

Mary, a STEM teacher, accompanies her students once a week in the nearby makerspace as an after school activity. The students spend 2 hours in the makerspace before the next guest group arrives. Mary is interested in understanding how the learning experiences in the makerspace impact on her students' understanding of 21st century skills. For this purpose she encourages them to use the Assessmake21 tool. She has activated the 3rd approach. When the maker session is over, Mary gathers her students in the reception area of the makerspace and invites them to rate the skills that were practiced and take a series of activities based on their answers.

CHECK THE FOLLOWING VIDEO TO SEE HOW EACH SELECTION EFFECTS THE APPEARANCE OF THE MAIN INTERFACE



<https://www.youtube.com/watch?v=GFIGYB65QhY>



TASK 1

SETTING YOUR OWN CLASSROOM

When creating a classroom in the Assessmake21 tool, you will indicate how and when the tool will be used by selecting one of the three approaches.

Which approach does better suit your classroom/makerspace activity and why?

Reflect upon your needs and create your classroom.

<https://educator.assessmake21.eu>

The screenshot displays the 'ASSESSMAKE21 Educator's Dashboard' on the left sidebar with navigation options: Home, Create a new classroom, and Exemplar Class. The main content area is titled 'Choose approach' and includes a '< Back' link. Below this is a header section 'Approaches' with the text 'You know your students better than us!' and an illustration of a man at a laptop. Three approach cards are shown, each with an illustration and a description:

- Parallel Approach**: Students input what skills they think they are using and complete activities during the maker session.
- Parallel tapping / challenges at the end**: Students input what skills they think they are using during the maker session and complete activities at the end of the classroom.
- At the end Approach**: Students at the end of the classroom rate on a scale which skills they think they were using during their maker sessions. Then take a series of activities based on their input.

At the bottom right, there are 'Cancel' and 'Next' buttons.



A CLOSER LOOK AT DURATION

Another feature that adds flexibility to the tool by increasing or decreasing the number of activities that your students have to take in order to move from one level to the next, thus altering the entire experience of the tool, is duration. As previously mentioned, you can choose among three different duration modes, namely the short, the medium and the long duration.

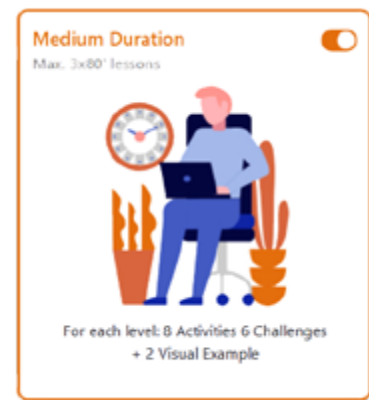
SHORT DURATION



IN THIS MODE, YOUR STUDENTS NEED TO COMPLETE **5** ACTIVITIES, COMPRISING **4** CHALLENGES AND **1** VISUAL EXAMPLE TO LEVEL UP EACH SKILL.

MEDIUM DURATION

THIS MODE SETS THE NUMBER OF ACTIVITIES TO **8**, WITH **6** CHALLENGES AND **2** VISUAL EXAMPLES NEEDED TO BE COMPLETED TO LEVEL UP EACH SKILL.



LONG DURATION



THIS MODE ASKS FROM YOUR STUDENTS TO COMPLETE **12** ACTIVITIES, COMPRISING **8** CHALLENGES AND **4** VISUAL EXAMPLES TO LEVEL UP EACH SKILL.



A CLOSER LOOK AT ACTIVITIES

There are 4 types of activities:

The **basic challenges**, and the **two step challenges** - which are interconnected challenges displayed one after the other - are trying to record different dimensions of a skill through rated or multiple-choice questions.

The **picture taking challenges** ask from the students to assess the visual examples that they have uploaded.

Finally, the **open-ended challenges** are questions that encourage students to express themselves by writing a few words regarding a selected skill.

BASIC/ TWO STEP CHALLENGES

What were you doing that made you pick Collaboration?

- Develop shared understanding
- Contribute collectively
- Regulate the work of the group
- Develop good relationships with others and a sense of well-being in a community

Done >

How does [Challenge2_Selection] make you feel?

- | | |
|---|---|
| <input checked="" type="checkbox"/> happy | <input type="checkbox"/> satisfied |
| <input type="checkbox"/> honest | <input checked="" type="checkbox"/> ambitious |
| <input type="checkbox"/> stressed | <input type="checkbox"/> anxious |
| <input type="checkbox"/> weak | <input type="checkbox"/> compassionate |
| <input type="checkbox"/> empathetic | <input type="checkbox"/> overwhelmed |
| <input checked="" type="checkbox"/> focused | <input type="checkbox"/> bored |
| <input type="checkbox"/> angry | |


PICTURE TAKING CHALLENGES

1 ————— 2 ————— 3 ————— 4

What were you doing in this example for Collaboration?

Cooperating with other team members

Done >



OPEN-ENDED CHALLENGES

How did this tool help you develop Collaboration? Share this moment here.

Useful on allocating roles

Done >



find more here:

<https://www.youtube.com/watch?v=BbbtTXswXuI>



A CLOSER LOOK AT LEVELS

No matter which approach and duration you will select, the number of levels remains the same. As a matter of fact, the students are encouraged to go through **four levels**. The four levels help illustrate the difference in progression between each skill and give a feeling of progress satisfaction. The final phase “infinite” comes as a never ending phase for the students to continue using the tool and keep developing their 21st century skills.

THE FOUR LEVELS



Each skill has 4 levels through which the students can progress by completing a number of activities. The use of the first 4 levels adds linearity, creating to your students the satisfaction of progression.

THE INFINITE LEVEL



After completing the 4 levels your students enter in the Infinite level. This level is always available to self-assess and develop their skills. Therefore, it gives them the possibility to have a tool of a never-ending use and thus be able to develop and self-reflect and assess the 5 skills in a never-ending cycle.



MONITORING CLASSROOM PROGRESS

The Assessmake21 tool gives educators access to features for monitoring their classroom progress towards developing their 21st century skills.

Three features are available for monitoring: Latest examples, Skills Curve and Skills Development.

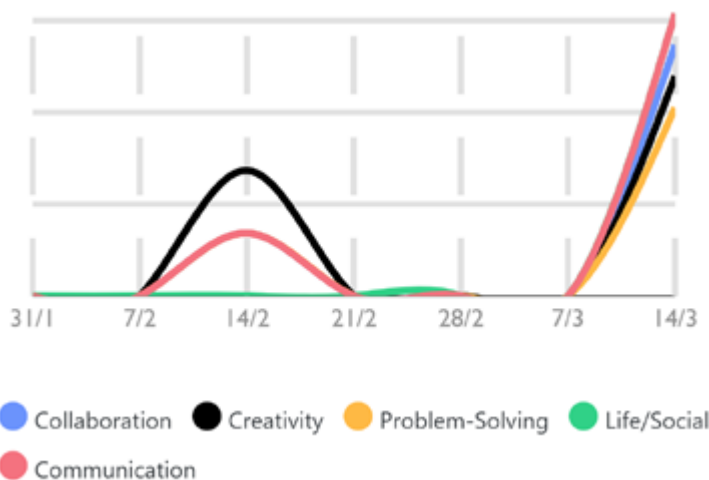
LATEST EXAMPLES



Here the educators can see the examples/pictures (8 in total) that have been lately uploaded by the students. The examples are categorized per skill.

Among the latest examples in this class is Chris' picture taken to represent good practice in Communication.

SKILLS CURVE



The skills curve is a graphical representation of the tags per skill in certain periods of action in the makerspace.

Here we see that from March 7 to March 14 there was a significant increase in the number of tags for the skills of communication, collaboration, creativity and problem solving.



MONITORING CLASSROOM PROGRESS

SKILLS DEVELOPMENT

Skills Development

Most tagged skills

- 01** |  **Collaboration**
20 total tags
- 02** |  **Life/Social**
17 total tags
- 03** |  **Communication**
15 total tags
- 04** |  **Creativity**
13 total tags
- 05** |  **Problem-Solving**
13 total tags

The Skills Development card shows the most tagged skills by the students. The skill that received the most tags is placed first. The number of tags per skill is also available.

Here we see that Collaboration is the most tagged skill with 20 in total tags. The skills that received the least tags are Creativity and Problem-solving.

In this way, the educator can have a quick overview of the skills tagged and practiced and based on this information to organize remedial actions accordingly.

Apart from an overview of the classroom progress, the educators also have access to each student profile card where they can see more details.

The educators can see the profile cards of all the students registered in the class. Each profile card is clickable and leads to additional information.



find more here:

https://www.youtube.com/watch?v=yh_bSHAplcs














MONITORING CLASSROOM PROGRESS

< Back

Student Profile

Get an insight into your students and their 21st century skills.



 Collaboration	Level 3 ●●●●●●●●○ 9/10 Activities Completed	3 Examples	 Lvl. 2 Award
 Creativity	Level 2 ●●●●●○○○○○ 5/9 Activities Completed	1 Examples	 Lvl. 1 Award
 Problem-solving	Level 2 ●●●●●○○○○○ 5/9 Activities Completed	1 Examples	 Lvl. 1 Award
 Life/Social	Level 3 ○○○○○○○○○ 0/9 Activities Completed	2 Examples	 Lvl. 1 Award
 Communication	Level 2 ○○○○○○○○○ 0/9 Activities Completed	1 Examples	 Lvl. 1 Award

Skills Development

Most tagged skills

- 01** |  **Collaboration**
12 total tags
- 02** |  **Life/Social**
8 total tags
- 03** |  **Creativity**
7 total tags
- 04** |  **Problem-Solving**
7 total tags
- 05** |  **Communication**
4 total tags

The images on this page present a student's profile. The educator was redirected here after clicking on student's profile card. Now, the educator can see the student's progress for each skill, the examples that have been uploaded and the requests for badges. The card with the most tagged skills by this student, is also available to the educator.

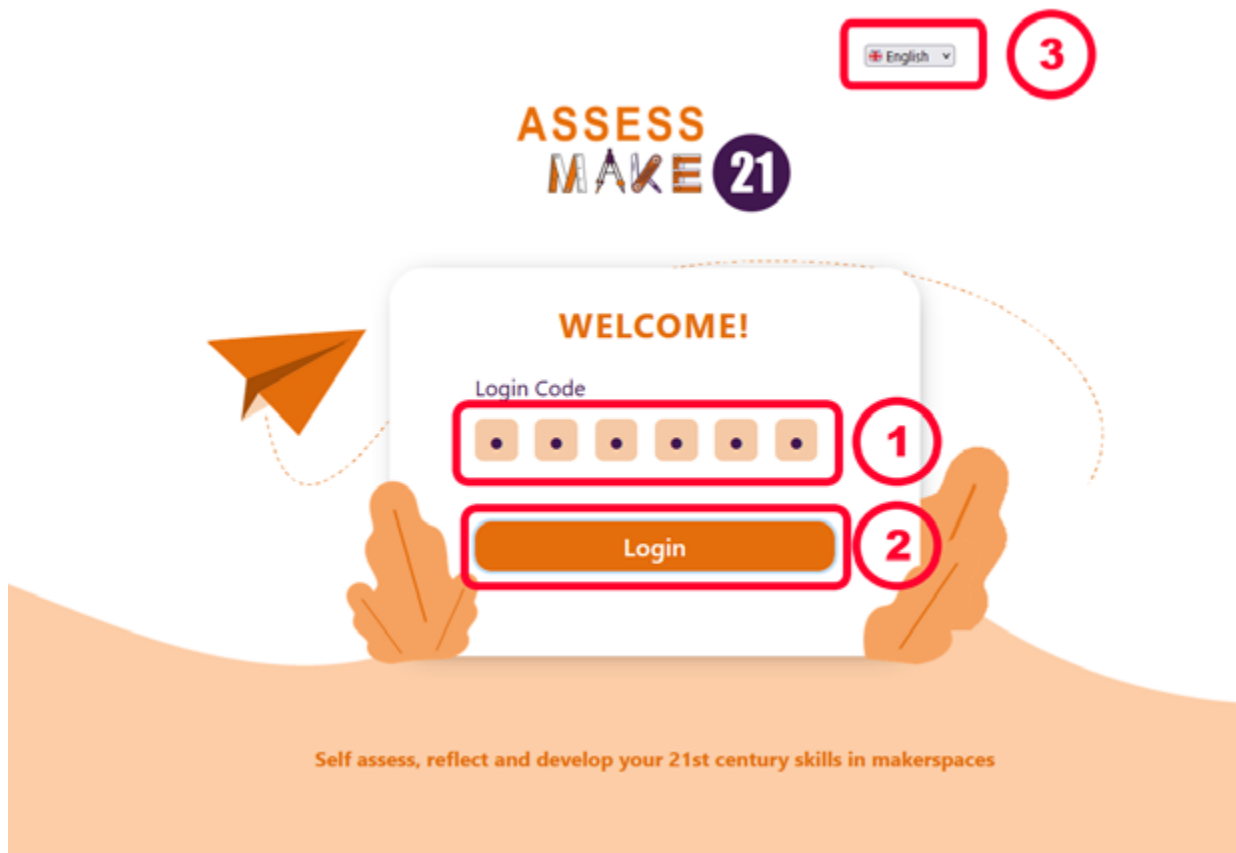


Students' dashboard

In this section the Student's dashboard will be presented. Here you will find an overview of the different menus (namely Skills, My Portfolio, My Badges, Examples and Definitions) as well as scenarios of implementation, functioning as exemplary and inspiring stories.



Your students can enter to the Student's Dashboard, by inserting their personal unique code to the Login Code fields (1) and pressing the Login (2) button. Make sure that they are correctly typing their personal code. Before entering the dashboard they have the option to change the language to the national one by selecting it from the corresponding floating menu (3).



<https://student.assessmake21.eu>



SELF-ASSESSMENT PROCESS

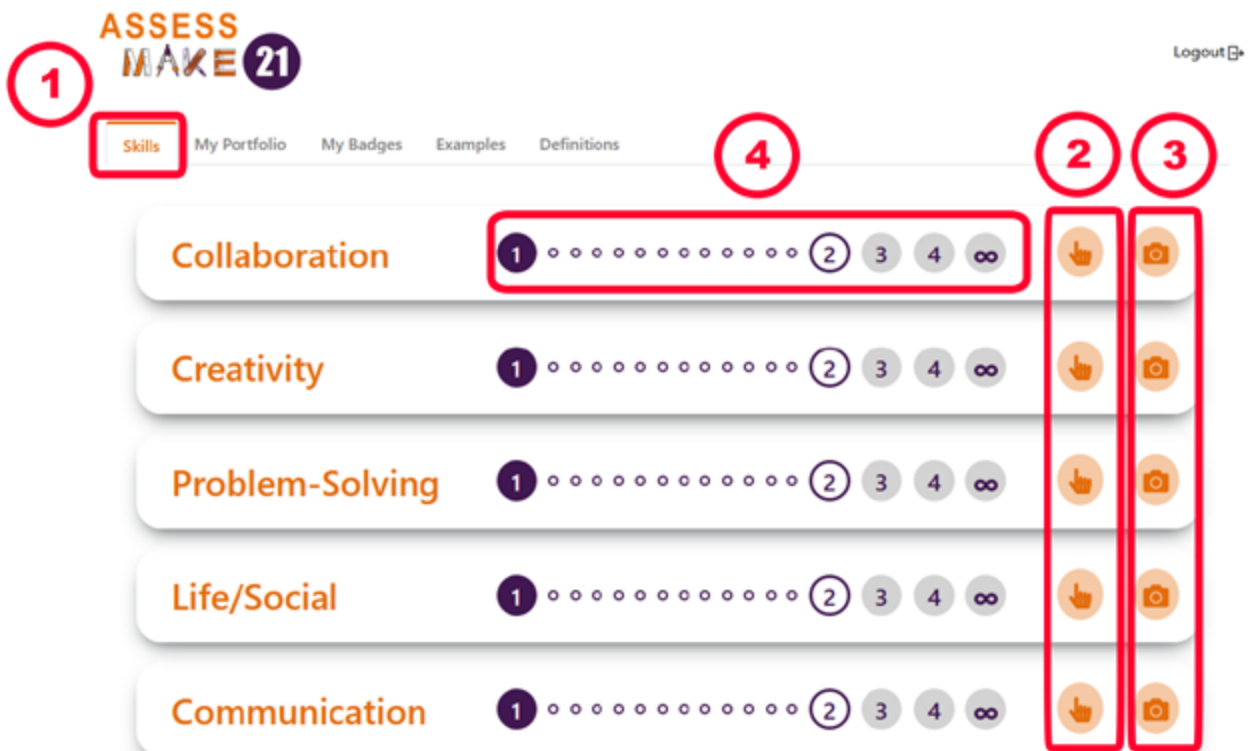
PARALLEL APPROACH INTERFACE

This is the homepage of Students' Dashboard when **First Approach (Parallel Approach)** has been selected.

During the maker sessions, students can go to the Skills menu **(1)** and tap on the relevant Index Hand Button **(2)** or the Camera button **(3)** to respectively input or capture their work, each time they feel that they are using one of the 5 different skills (namely Collaboration, Creativity, Problem-Solving, Life/Social and Communication). Once they tap on the aforementioned buttons, a confirmation message - with a thumb up gesture - will appear on their screen. After that, they need to tap once more, to start (self)assessing the selected skill through a number of challenges.

As they are completing the challenges, students can observe their progress towards the next level of the skill through the dotted progress bar **(4)**. The number of dots varies, depending on the selected duration level (i.e, 9 dots for Short Duration, 12 for Medium and 14 for Long).

After completing a level they can claim and collect the corresponding badge.



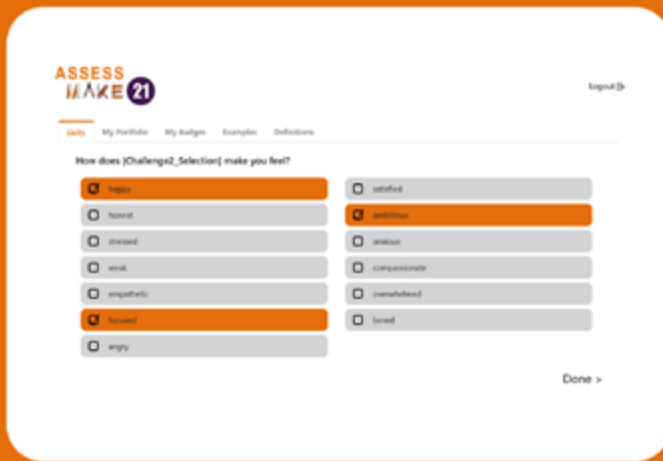
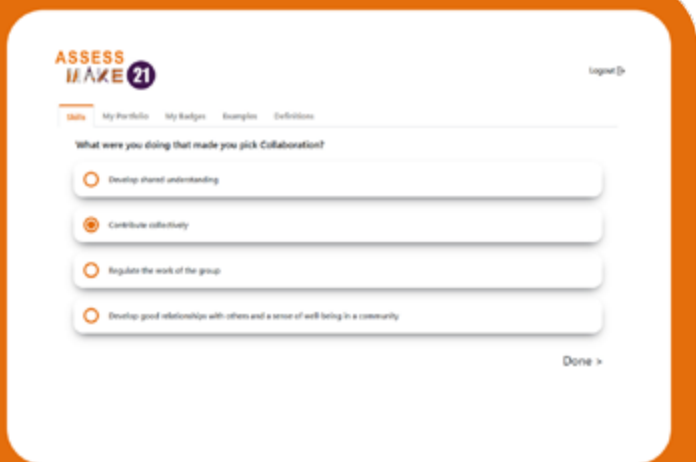


SELF-ASSESSMENT PROCESS

PARALLEL APPROACH INTERFACE

SCENARIO:

Steven is one of Anna's students (from the scenario in page 27). During a project that he is working with his team he realizes that he is using the skill of Collaboration. Therefore, he is opening/accessing the Assessmake21 tool and tapping on the Collaboration skill. A question asking him to justify the reason that he picked collaboration skill, appears. From the list of selections he is picking the "Contribute collectively" condition, since he is realizing that all the members of the team are equally working towards the successful implementation of the project. He is pressing "Done" to move to the next step in which he is asked to express how the selected condition makes him feel by checking those attributes that better reflect his sentiments/feelings. Since he is not working alone he feels more focused on the aim of the project, ambitious about the successful implementation of the project and happy for the entire process. After checking the corresponding boxes and pressing "Done" he observes (in the progress bar) that he is one step closer to Level 2.

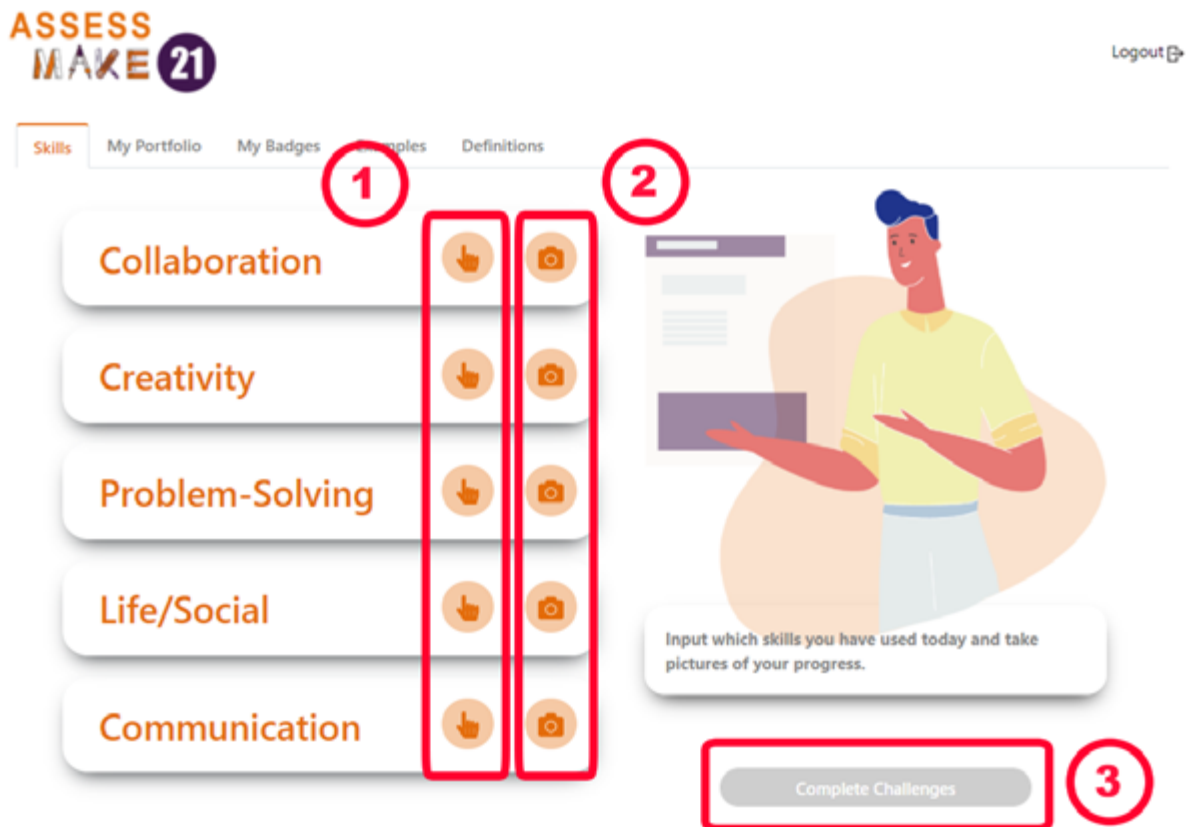




SELF-ASSESSMENT PROCESS

PARALLEL TAPPING / ACTIVITIES AT THE END INTERFACE

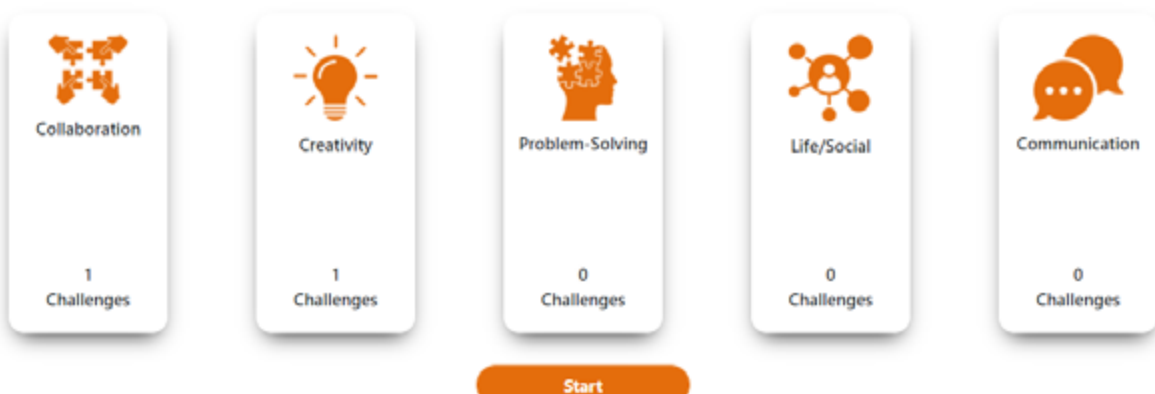
This is the homepage of Students' Dashboard when the 2nd Approach (Parallel tapping Activities at the End) has been selected. Here, students tap on the corresponding index hand button (1) or take a picture of their progress through the Camera button (2), whenever they feel that they are using one of the 5 different skills during the maker sessions. Then, when the session is over, and based on their input, they can tap on the Complete Challenges button (3) to complete a number of activities, in order to get closer to or claim a badge.



After tapping on the Complete Challenges button, the students can see an overview of the number of challenges they have activated during the making process. By tapping on the Start button they activate the challenge taking process.

< Back

Based on skills you used during your making session
you will complete the following challenges

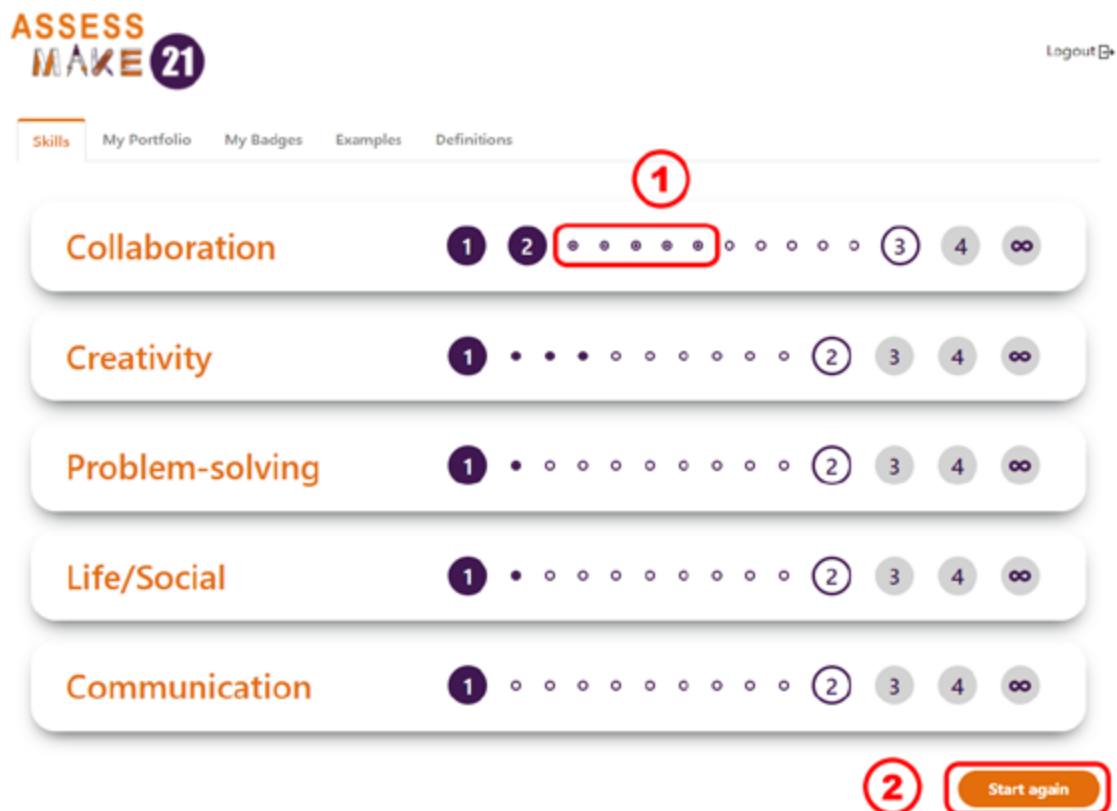




SELF-ASSESSMENT PROCESS

PARALLEL TAPPING / ACTIVITIES AT THE END INTERFACE

Once they complete the activated challenges, the students are redirected to new menu, in which they can have an overview of their progress for each skill. On the progress bar, the filled dots represent the challenges that have been previously obtained, while the semi-filled dots **(1)** represent the challenges that were just completed.



After observing their progress, the students can tap on the “Start again” button **(2)** to continue tagging skills and taking challenges, or they can simply click on the “Logout” button to sign out from the application.



SELF-ASSESSMENT PROCESS

PARALLEL TAPPING / ACTIVITIES AT THE END INTERFACE

SCENARIO

Natalia is one of George's students (from the example in page 28). While working on an arduino-based project with her team, she felt that she was using the skill of Collaboration and decided to take a picture of the current state of the project. Therefore, on the Assess-make21 tool, she tapped on the Camera button located on the Collaboration skill and took a picture during the creation of the circuitry. Then, she continued working on her project. At the end of the classroom she returns to the application to take a number of challenges regarding the picture she previously upload. She taps on the "Complete Challenges" button and she is asked to assess the image (and consequently the skill of Collaboration) through a number of consecutive questions, such as "What were you doing in this example for Collaboration?", "Why do you think this is a good example of collaboration" etc. After finishing the assessment, she taps on the "Done" button and goes back to the main menu. Through this process she feels that she is becoming more aware regarding the skill of collaboration and she is challenging herself to find more ways to boost this skill while working on her projects.

ASSESS
MAKE 21

Logout

Skills My Portfolio My Badges Examples Definitions



What were you doing in this example for Collaboration?

working with members of my team

Done >



ASSESS
MAKE 21

Logout

Skills My Portfolio My Badges Examples Definitions



Why do you think this is a good example for Collaboration?

Shows the process of collaboration

Done >



ASSESS
MAKE 21

Logout

Skills My Portfolio My Badges Examples Definitions



Rate how good an example of Collaboration it is.



Done >





SELF-ASSESSMENT PROCESS

AT THE END INTERFACE

This is the homepage of Students' Dashboard when 3rd Approach (At the End) has been selected. Here, and at the end of the classroom, students can rate the 5 skills **(1)** and to what extent they were using them by sliding the graph bar **(2)** to the corresponding position (ranging from 0 to 4). After rating each skill, they can move to the next one, or to the previous one if they need to change the rate value, by correspondingly tapping on the Next or the Back button **(3)**.

The screenshot shows the 'ASSESS MAKE 21' interface. At the top right is a 'Logout' button. Below the header is a navigation menu with 'Skills' selected, followed by 'My Portfolio', 'My Badges', 'Examples', and 'Definitions'. The main content area features a prompt: 'Rate which skills you have used today and in what extent. Then complete some challenges for them.' Below this is a progress bar with five skill categories: Collaboration, Creativity, Problem-solving, Life/Social, and Communication. The 'Collaboration' skill is currently selected. Below the progress bar is a slider for 'Collaboration' with a scale from 0 to 4, where the value is currently set to 1. At the bottom right, there are 'Back' and 'Next' buttons.

Then, they are redirected to an overview of the number of challenges they are about to take, based on their input. By tapping on the Start button they activate the challenge taking process.

< Back

Based on skills you used during your making session
you will complete the following challenges

The challenge overview screen displays five skill categories with their respective challenge counts:

Skill	Number of Challenges
Collaboration	1
Creativity	1
Problem-Solving	0
Life/Social	0
Communication	0

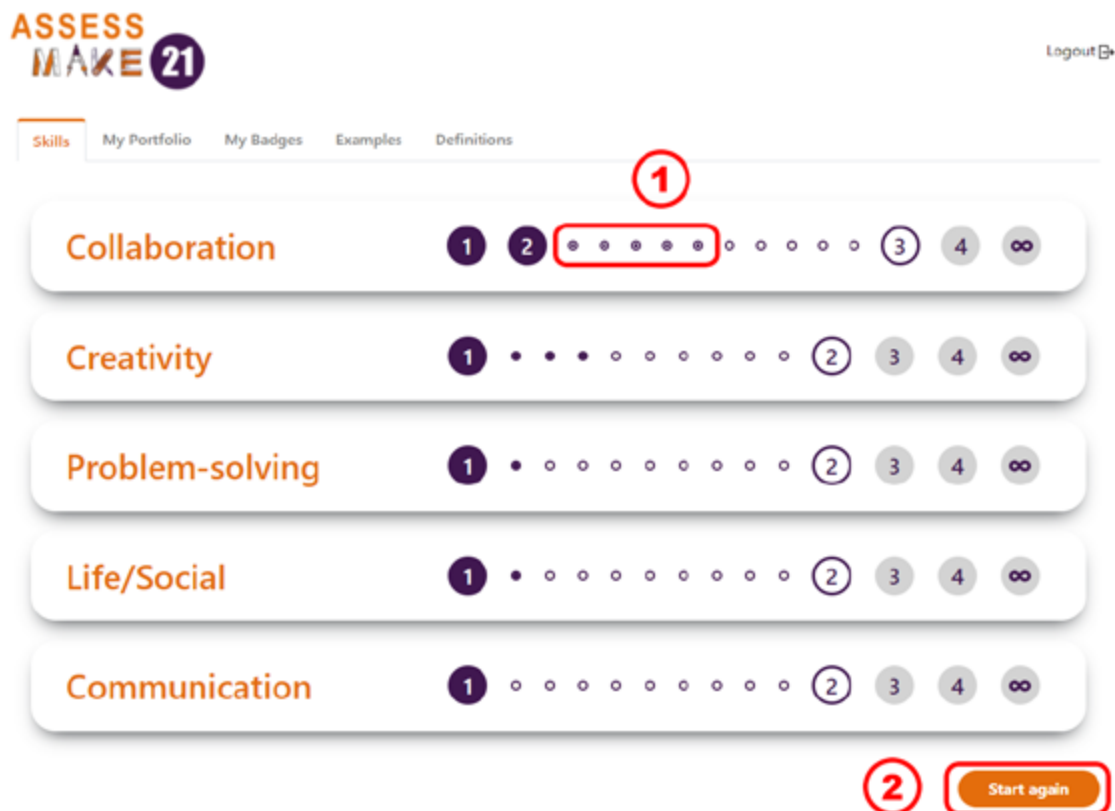
A 'Start' button is located at the bottom center of the screen.



SELF-ASSESSMENT PROCESS

AT THE END INTERFACE

Once they complete the activated challenges, the students are redirected to new menu, in which they can have an overview of their progress for each skill. On the progress bar, the filled dots represent the challenges that have been previously obtained, while the semi-filled dots **(1)** represent the challenges that were just completed.



After observing their progress, the students can tap on the “Start again” button **(2)** to continue tagging skills and taking challenges, or they can simply click on the “Logout” button to sign out from the application.

Click here to find a video showing how each approach affects students' skill-tagging experience:



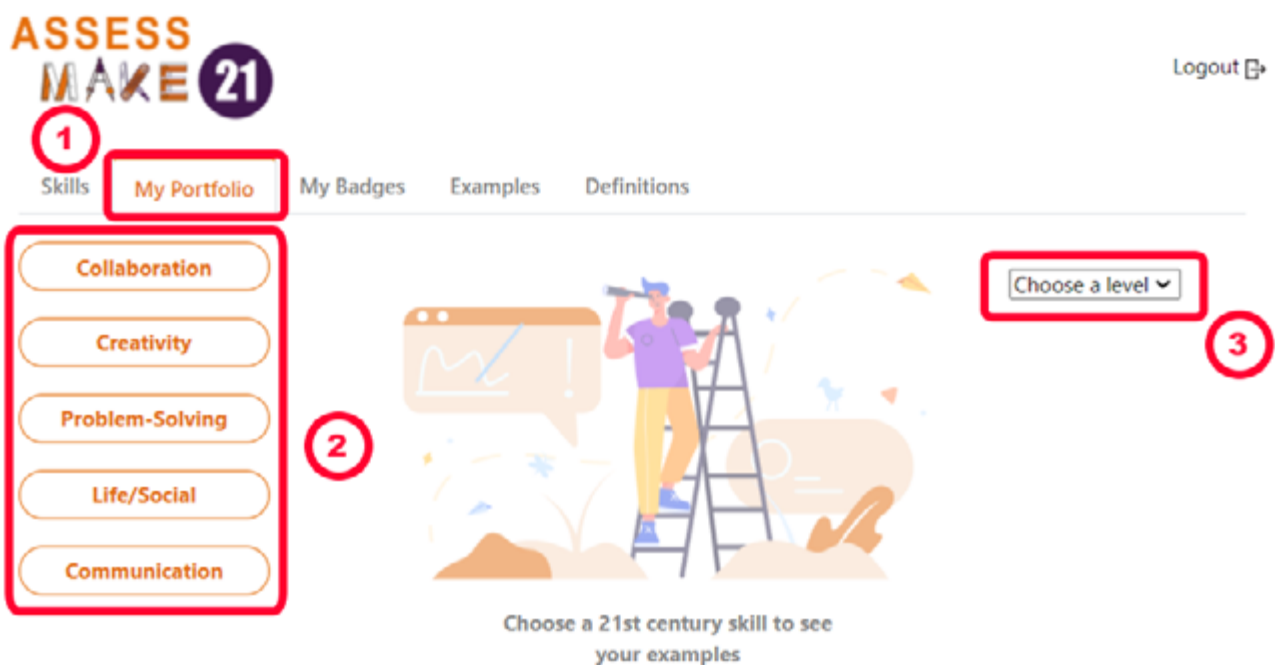
<https://www.youtube.com/watch?v=GFIGYB65QhY>



OVERVIEW OF THE MY PORTFOLIO

My Portfolio is a section in which students can have an overview of the examples they have uploaded so far, regarding each one of the skills.

To do that they can tap on My Portfolio tab (1) and choose among the five different skills, by tapping on the corresponding button (2). After choosing the skill, they can determine the level that they want to have an overview of the corresponding uploaded paradigms, by tapping on choose level box (3) and selecting the level from the floating menu.



Note:

My Portfolio tab - and the contained menus therein - is the same for all the three different approaches.

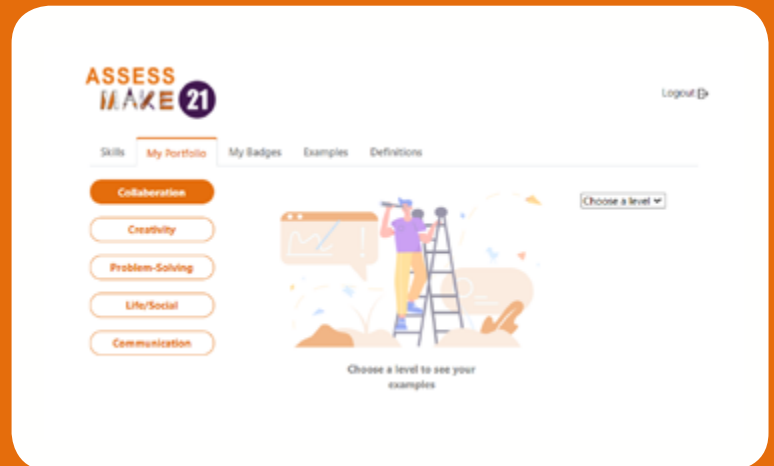
Click here to find a video with an overview of my portfolio menu:



<https://www.youtube.com/watch?v=1aBty7KfEt8>

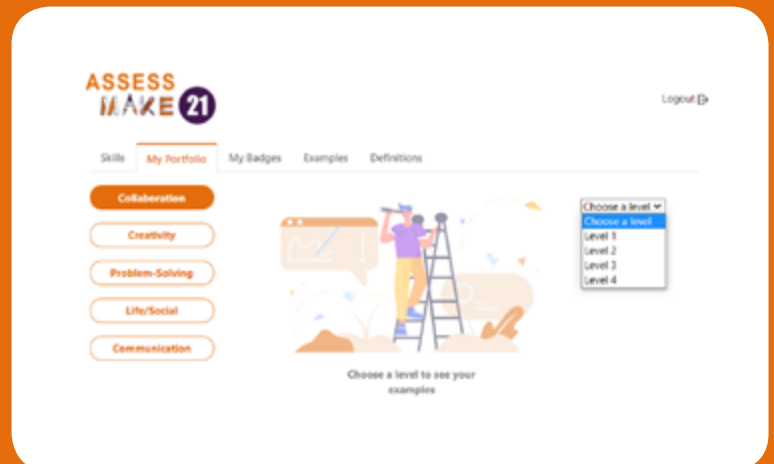


OVERVIEW OF THE MY PORTFOLIO



SCENARIO

George is a high school student, who has been using the Assessmake21 tool for the last 3 months. He wants to refresh his memory regarding the examples of collaboration that he uploaded at level 2. He taps on Collaboration, and the “Choose Level” menu is activated (i.e., the colors of the Collaboration button are inverted while the “Choose Level” menu is highlighted). Then, from the floating menu he taps on Level 2 and all the examples that he had uploaded (for this level) appear on the screen. He can see the images that he uploaded, the date of the upload, and a short description regarding the content and the way it is connected to the selected skill.





OVERVIEW OF MY BADGES

My Badges is the section where students can have an overview of: a) the badges that they have been awarded, b) the badges that have been requested and the award is pending and, c) the badges that have not been requested yet. By tapping on My Badges tab (1), the students can select a skills (2) to check their progress.

ASSESS
MAKE 21

Logout

Skills My Portfolio **My Badges** Examples Definitions

Collaboration

Creativity

Problem-Solving

Life/Social

Communication

1

2

Requested

Creativity Level 1

Creativity Level 2

Creativity Level 3

Creativity Level 4

There are 4 different badges for each skill. The image below shows the four available badges for the skill of Collaboration. Students can claim these badges by completing the challenges of each level. Then, based on the provided information, you will decide whether or not your students should be awarded with the corresponding badge. Students cannot claim a badge of a higher level without having completed the previous level (e.g., George, from the previous scenario, can claim the badge of Collaboration for level 3 only if he has previously completed level 1 and level 2).





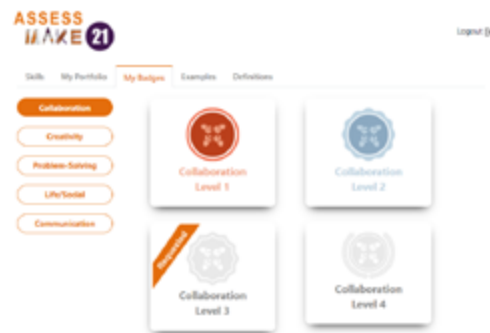
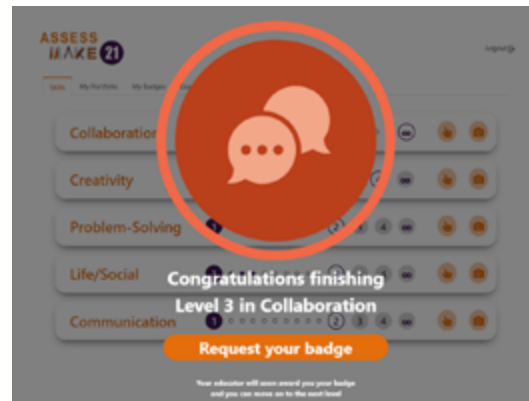
OVERVIEW OF MY BADGES

STUDENTS' DASHBOARD

SCENARIO 1

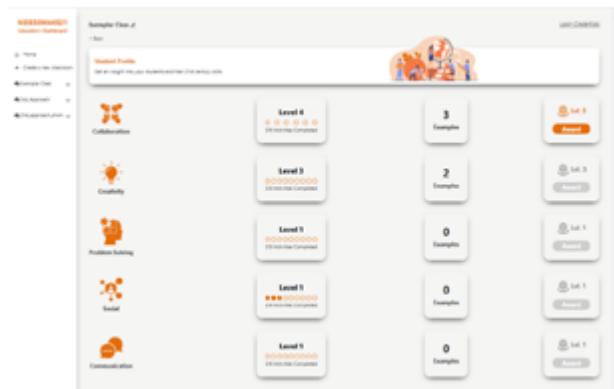
Phillip uses the Assessmake21 tool to reflect upon the skill of collaboration. He has just completed Level 3 and a message pops up, informing him that he has finished Level 3 and can now request the corresponding badge.

He taps on the “Request your badge” button, and waits for his educator to approve his work and award the badge. To make sure that the request has been sent, he goes on the “My Badge” menu, to check the status of the Collaboration badges. He notices that there is a ribbon on the badge for Level 3 writing “Requested”. While he waits with excitement for the badge, he continues working on his maker activities.



EDUCATOR'S DASHBOARD

Veronica is Phillip's teacher. She notices a warning that one of her students, Phillip, has requested a badge. She taps on his profile and she is informed that Phillip has finished Level 3 for the skill of Collaboration. She will check all his answers on the challenges and the examples, in order to decide whether or not she will award the requested badge.





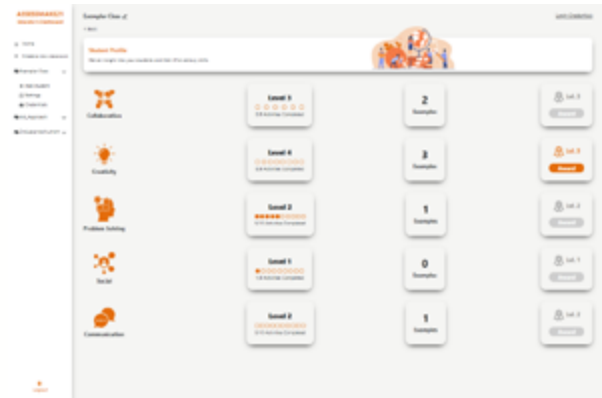
OVERVIEW OF MY BADGES

SCENARIO 2

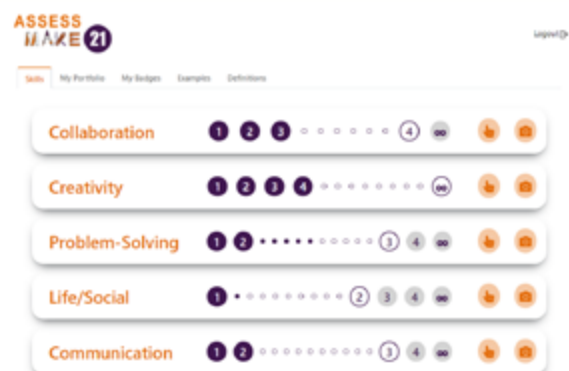
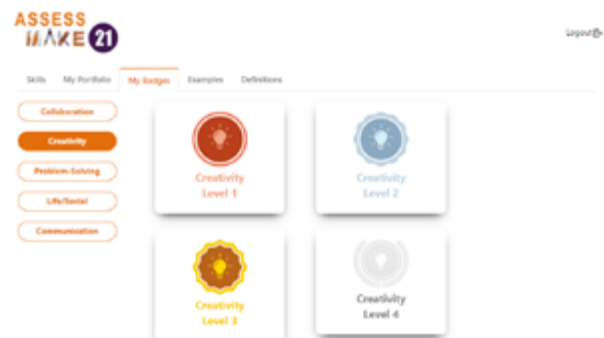
Veronica - the makerspace facilitator from the previous scenario - also checks the progress of other students since she has a maker session with them tomorrow. Normally, she spends 30 minutes going through all students' profiles. She is tapping on Sara's profile and enthusiastically realizes that Sara has fulfilled several challenges for most of the skills. She has also sent a request for the Creativity badge for the 3rd Level. Veronica reviews Sara's answers and her uploaded examples and gladly approves the request. Overall she is very satisfied with Sara's progress. However, she is a bit skeptical regarding the "Life/Social" skill, since it is the only skill that Sara has not taken many challenges yet. She is thinking to give her some time and if there is no improvement, to discreetly give some advice regarding this skill during the forthcoming maker session.

Sara - Veronicas' student - checks her dashboard to see if she has received the Creativity badge for the 3rd level. She is happy to see that she has been rewarded with the badge. She takes a look at the rest of the badges, as well as at the homepage of the dashboard, where the progress of each skill is depicted. Overall she is satisfied with her progress, except for the "Life/Social" skill. Therefore, she decides to focus more on this skill.

EDUCATOR'S DASHBOARD



STUDENTS' DASHBOARD



Find here an example of awarding-receiving a badge:
<https://www.youtube.com/watch?v=l0jpc6kes0>



OVERVIEW OF MY BADGES

SCENARIO 3

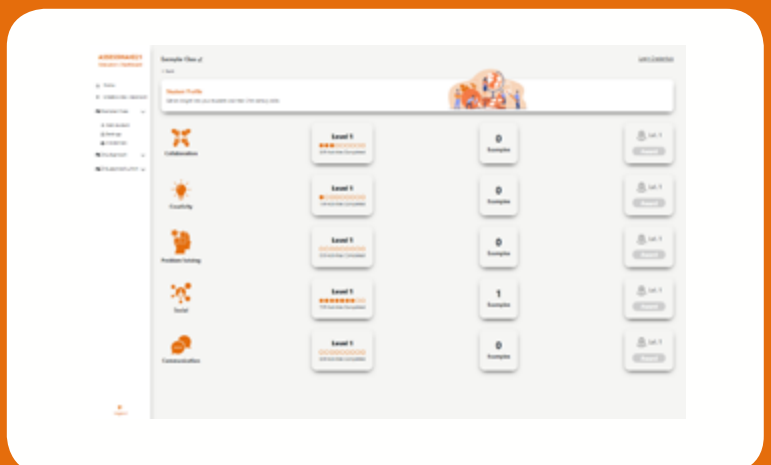
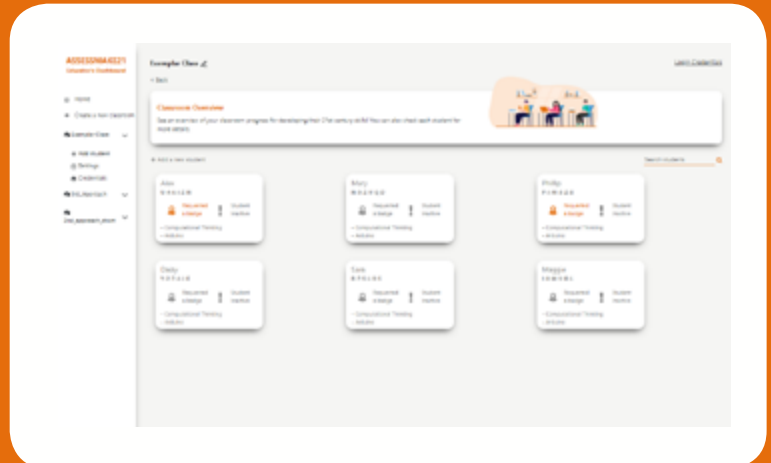
Daisy and Sara (from the previous scenario) work together on a maker activity/project. Unlike Sara's profile, Daisy's profile is rather poor in terms of progress.

Their educator, Veronica, is really surprised as she has noticed that Daisy has a meaningful participation in the maker activity/project. Daisy has only made some progress in the assessment of Life/Social skill, a skill that was not assessed enough by Sara. She is wondering if Daisy does not feel confident in assessing the rest of the skills, or if she does not recognize that she is practicing the other skills as well. She is thinking of having an encouraging discussion with both of them and highlighting a number of hypothetical cases during the making process in which one or more skills can be reflected and recognized.

Nevertheless this was an interesting case as Veronica realized that not all the skills are grasped the same way by all the students and that a targeted intervention is sometimes useful.

After having a discussion with her teammate Sara, Daisy is entering the student's dashboard to check her progress. She is aware that she has a rather poor progress on assessing the skills. She has made some progress with the "Life/Social" skill, since she finds it easier to be assessed, but she hasn't done much with the rest of the skills because she feels that the application distracts her from the making process. She is thinking of at least taking some pictures during the making process, and try to assess the skills later on.

EDUCATOR'S DASHBOARD



STUDENTS' DASHBOARD





OVERVIEW OF EXAMPLES

Examples (1) is the section where the students can find paradigms related to the material and the content they can upload for each skill during the self-assessment process (2). Apart from examples of images and text, a short definition for each one of the skills, is also available.

The screenshot shows the AssessMake21 interface. At the top left is the logo 'ASSESS MAKE 21'. A welcome message reads: 'Greetings George! Welcome to AssessMake21. Here you will learn all about the 21st century skills!'. A 'Show me around' button is next to it. A 'Logout' link is at the top right. Below the header is a navigation bar with 'Skills', 'My Portfolio', 'My Badges', 'Examples', and 'Definitions'. The 'Examples' tab is highlighted with a red box and a circled '1'. On the left, a vertical list of skills is shown, each in a rounded rectangle: 'Collaboration', 'Creativity', 'Problem-solving', 'Life/Social Skills', and 'Communication'. This list is enclosed in a red box with a circled '2'. To the right is an illustration of two people using tools like a ladder and a telescope to explore large documents, with a circled '1' above it. Below the illustration, the text says: 'Choose a 21st century skill to see an example'.

Click here to find a video with an overview of the Examples menu:



<https://www.youtube.com/watch?v=1aBty7KfEt8>



OVERVIEW OF EXAMPLES



SCENARIO

Michael is a high school student who recently started to use the Assessmake tool/app. However, he does not feel very confident regarding assessing the Life/Social Skill, since he is not sure what kind of content can reflect this concept. He taps on the Examples section and selects the Life/Social Skills button. He finds two different paradigms consisting of an image and an explanatory text, as well as a short definition of the skill. He realizes that the paradigms are putting emphasis on parameters related to the development of confidence and self-improvement, while the definition is clarifying the main idea behind this specific skill. Now, Michael feels a little bit more confident and decides to start by going through the first challenges in Level 1.





OVERVIEW OF DEFINITIONS

Definitions (1) is the section where the students can find short definitions for the 5 skills (2), and go deeper into exploring the dimensions of each one of the 5 skills (3) by simply tapping on them.

The screenshot shows the ASSESS MAKE 21 website interface. At the top left is the logo. To the right is a 'Logout' link. Below the logo is a navigation bar with tabs for 'Skills', 'My Portfolio', 'My Badges', 'Examples', and 'Definitions'. The 'Definitions' tab is highlighted with a red box and a circled '1'. Below the navigation bar is a vertical list of five skill categories: 'Collaboration', 'Creativity', 'Problem-solving', 'Life/Social', and 'Communication'. This list is enclosed in a red box with a circled '2'. To the right of the list is an illustration of a person holding a tablet, surrounded by icons representing various skills. Below the illustration is the text: 'Choose a 21st century skill to learn more about it'.

The screenshot shows the ASSESS MAKE 21 website interface with the 'Definitions' tab selected. The 'Collaboration' skill category is highlighted in orange. Below the navigation bar, the text 'What is collaboration?' is followed by a definition: 'Collaborative learning is an active form of learning between two or more individuals that work together in a physical or virtual environment. Group members continuously attempt to build and maintain a shared understanding of the problem they are working to solve.' Below this is the text: 'Collaborative learning is developed through these dimensions.' To the right of this text is a circled '3'. Below the text is a list of four dimensions, each in a dark orange box with a white checkmark on the right: 'Develop shared understanding', 'Contribute collectively', 'Regulate the work of the group', and 'Develop good relationships with others and a sense of well-being in a group'. This list is enclosed in a red box.

Click here to find a video with an overview of the Definitions menu:



<https://www.youtube.com/watch?v=1aBty7KfEt8>

INSPIRING PROJECTS

3

The DIY Automobile project

The Lighthouse project

The sunflower project

The Smart Light project

The Alarm System project

The 3D printed penholder project

The interactive model of a lighthouse



Below we present making projects that were carried out by young makers resulting in the creation of creative digital and physical artefacts.

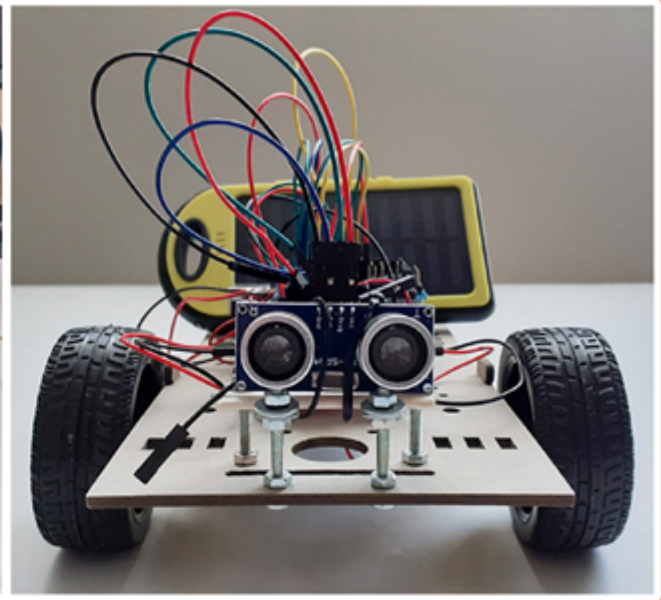
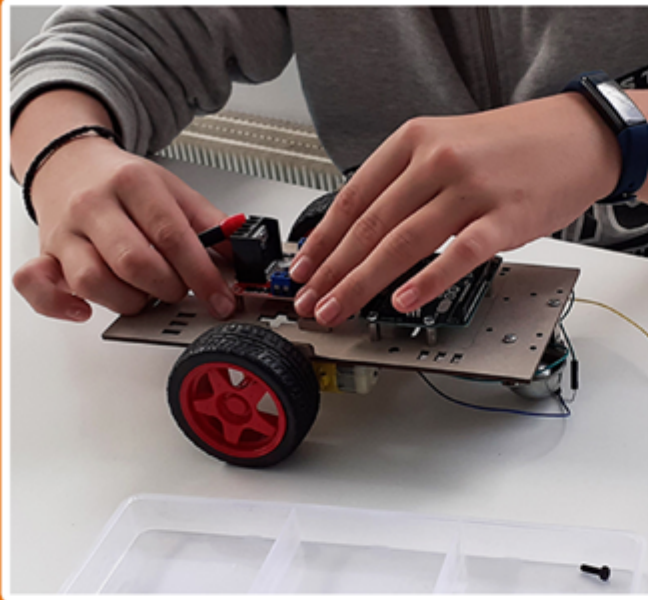
The projects showcase thoughtful educational practice and student centered learning with modern materials. The projects vary in complexity and duration, are free-form, capturing the essential heart and soul of the project instead of trying to fit them into a one-size fits-all “lesson plan” template.

In a few cases the idea for the project emerged after the discussion with the educator but this was adapted to students’ interests or extended by them. The project snapshots that appear below accommodate a wide variety of grades and experience levels, vary in length and expertise needed, and use many different tools, materials, software, and hardware.



PROJECT 1

THE DIY AUTOMOBILE PROJECT



Difficulty : ● ● ● ● ● **Duration :** 7 to 9 hours

Description:

The DIY automobile project revolves around the idea of creating a robotic vehicle that can freely move around space, while recognizing and avoiding obstacles. The project brings up aspects related to innovation and engineering as well as environmental policies, while engaging students to alternative learning methodologies through playful, but highly interrelated physics and mathematics scenarios and procedures.

LIST OF TOOLS:

Crafting material: cardboards, screws, nuts, spacers, popsicles

Hardware: Arduino board, Arduino Shield, DC motors, DC motor driver, Ultrasonic sensor, cables/jumpers, solar panel

Software: mBlock, Arduino IDE

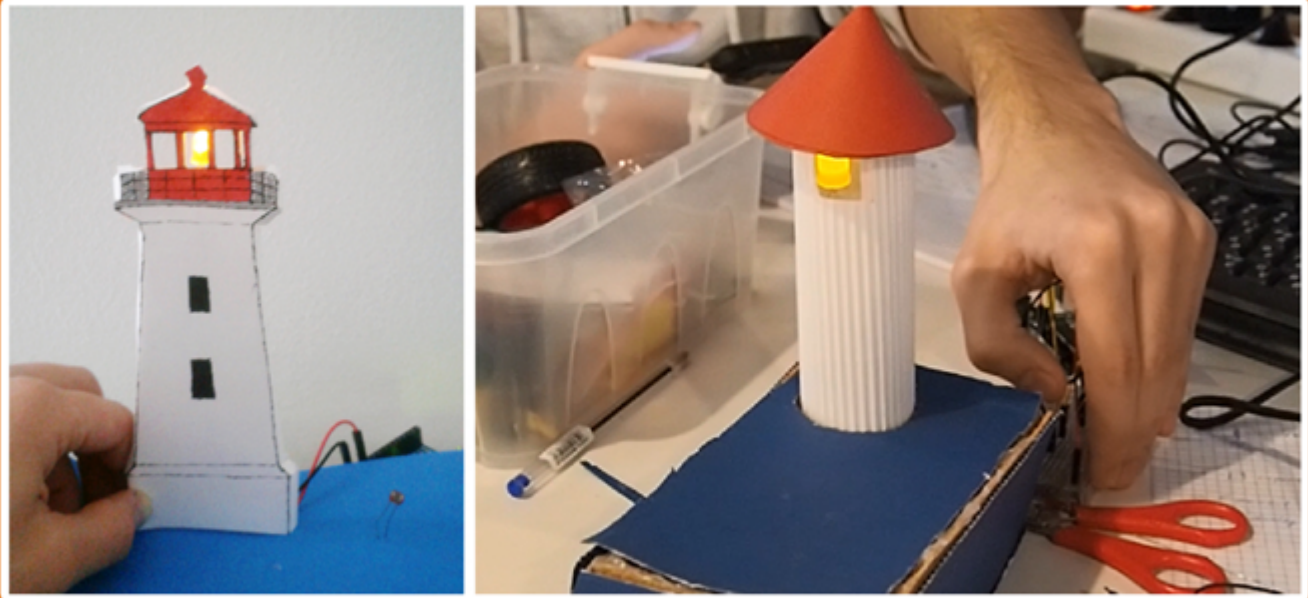


<https://www.youtube.com/watch?v=pOqYYeTYzDk> (short demo)



PROJECT 2

THE LIGHTHOUSE PROJECT



Difficulty : ● ● ○ ○ ○ **Duration :** 3 to 4 hours

Description:

This project is based on the implementation of the concept of the Lighthouse (i.e., a prominent edifice with a light that constantly blinks). It is considered as an introductory project towards makeology and project-based learning as well as towards the familiarization with DIY electronics and programming methods, while it is paving the way to more advanced scenarios (i.e., creating a lighthouse that blinks when dark is falling etc.).

LIST OF TOOLS:

Crafting material: cardboards, popsicles, paper cups, copper tape

Hardware: Arduino board, LED light, photoresistor, Ultrasonic sensor, resistors, wires/jumpers

Software: Snap4Arduino, mBlock, Arduino IDE

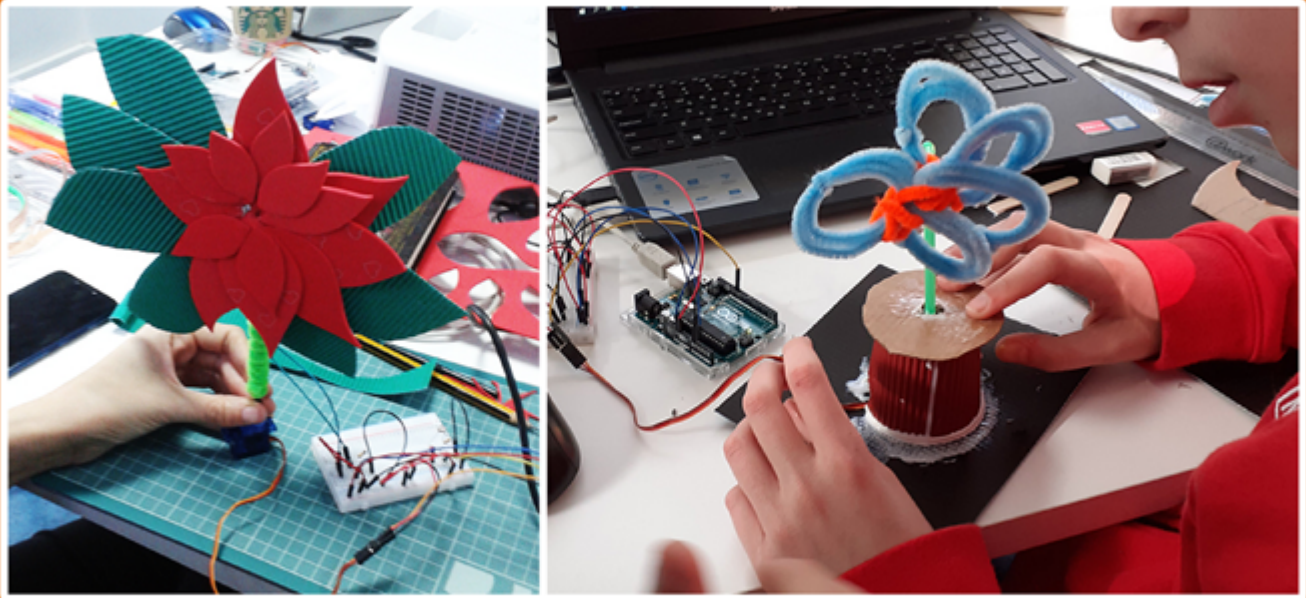


<https://www.youtube.com/watch?v=4YM8Tt3EuqU>



PROJECT 3

THE SUNFLOWER PROJECT



Difficulty : ● ● ● ○ ○ **Duration :** 3 to 4 hours

Description:

This project is based on the implementation of the concept of heliotropism (i.e., creating a robotic artefact that imitates the behavior of a sunflower, by detecting and turning towards the light). This project brings up issues related to physics and mathematics, while introducing students to more advanced programming methods (i.e., using variables, finding optimized solutions for a more accurate reproduction/representation of the concept of heliotropism etc.).

LIST OF TOOLS:

Crafting material: cardboards, popsicles, paper cups, straws, colored papers, copper tape

Hardware: Arduino board, photoresistors, servo motor, resistors wires/jumpers

Software: Snap4Arduino, mBlock, Arduino IDE



<https://www.youtube.com/watch?v=2cs9BqZ4Bbs>



PROJECT 4

THE SMART LIGHT PROJECT



Difficulty : ●●○○○ Duration : 3 hours

Description:

The Smart Light project revolves around the creation and programming of a light that is activated when some kind of movement or presence is detected, or when a certain level of ambient light and some kind of movement or presence are detected. This project brings up issues regarding environmental policies and smart cities.

LIST OF TOOLS:

Crafting material: cardboards, transparent papers, popsicles, copper tape

Hardware: Arduino board, PIR sensor, photoresistors, resistors wires/jumpers

Software: Snap4Arduino, mBlock, Arduino IDE

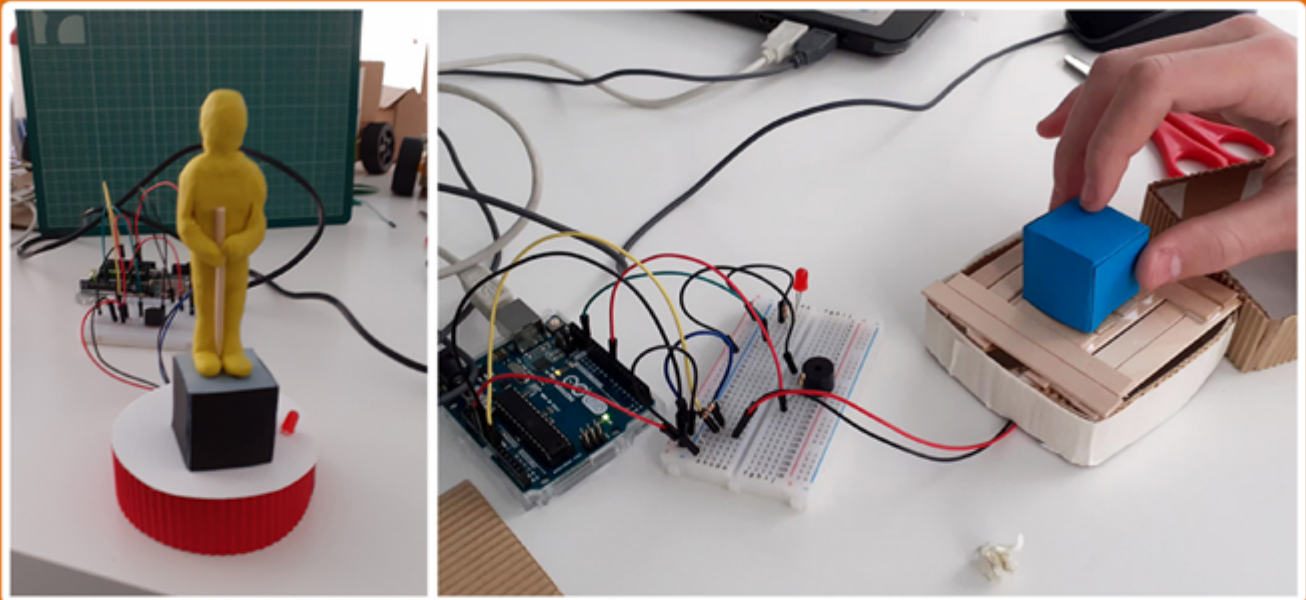


https://www.youtube.com/watch?v=2ca_A0tdV5o



PROJECT 5

THE ALARM SYSTEM PROJECT



Difficulty : ● ● ● ○ ○ **Duration :** 4 to 5 hours

Description:

This project revolves around the creation of an alarm system that is activated emitting optical and audio signals, when somebody tries to remove an object. The alarm system project is related to real case scenarios and problem solving, while highlighting methods of implementing and embedding computational systems in a rather small scale (i.e., home).

LIST OF TOOLS:

Crafting material: cardboards, popsicles, paper cups, plasticine

Hardware: Arduino board, photoresistor, buzzer, LED light,
photoresistors, resistors, wires/jumpers

Software: Snap4Arduino, mBlock, Arduino IDE

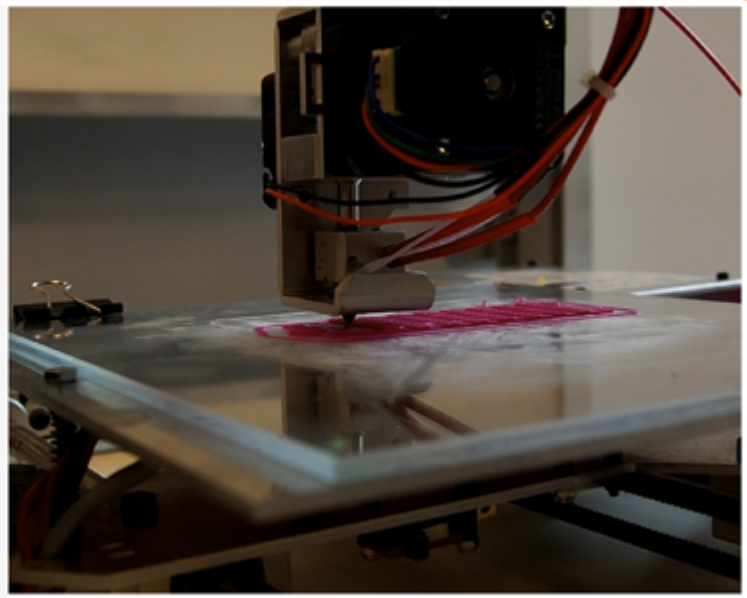
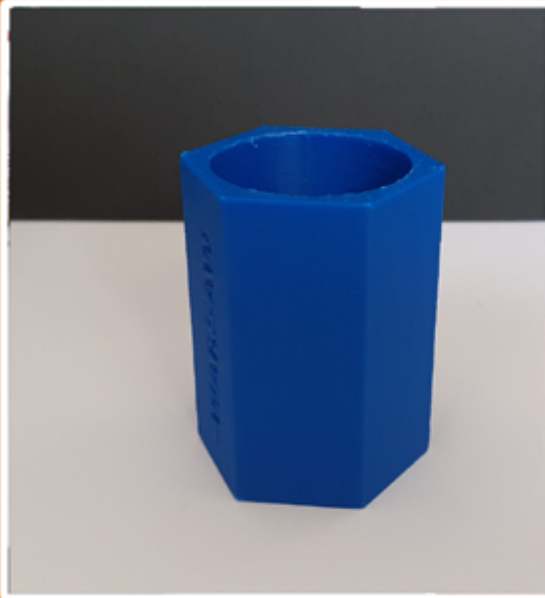


https://youtu.be/48Za_00TcGw?t=124 (short demo from 2:05 to 2:25)



PROJECT 6

THE 3D PRINTED PEN HOLDER PROJECT



Difficulty : ●●●●○

Duration : 2 to 3 hours*

**the size of the object affects the printing time*

Description:

This project revolves around the implementation of software for 3d modelling and 3d printing for creating and producing a pen holder. Through this project, the learners can become familiar with advanced methods regarding 3d modelling and 3d printing as well as with issues related to geometry and mathematics.

LIST OF TOOLS:

Crafting material: pencil and papers, cardboard

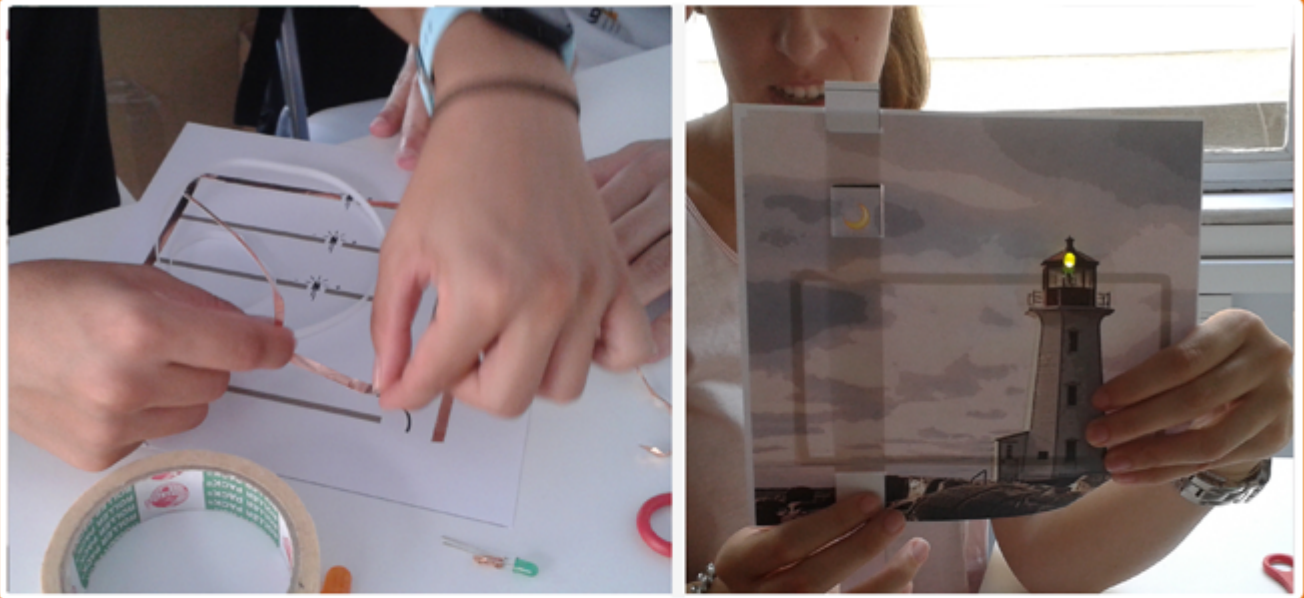
Hardware/ equipment: 3d printer, PC or laptop

Software: FreeCAD, Cura



PROJECT 7

INTERACTIVE PAPER MODEL OF A LIGHTHOUSE



Difficulty : ● ○ ○ ○ ○ **Duration :** 1 to 2 hours

Description:

This project revolves around the implementation of simple materials (such as paper, plasticine, copper tape etc.) towards the creation of simple circuits. Through developing interactive paper models - such as a traffic light, or a lighthouse - learners can be introduced and get familiar with circuit making processes and terminology related to electricity.

LIST OF TOOLS:

Crafting material: paper, copper tape, plasticine, cardboard, scissor/ cutter, non-conductive tape, paper clips

Hardware: LED, jumpers, batteries



https://youtu.be/48Za_00TcCw?t=23

(short demo from 0:23 to 0:40)



TASK 3

SHARING IDEAS



Would you like to include your students' work in this handbook?

We need a title, a short description, a representative picture, and optionally an estimation of the time needed for project completion and the tools that were used. Looking forward to include your students' work in this handbook!

Share your ideas/works here:

<https://padlet.com/edumotiva/ed3ndv7wgt0zftd1>



Edumotiva Lab 2mo
Wall of fame
Inspiring making projects

Edumotiva Lab 2mo

3 printed bridge



A 3D printed stable structure for bridges...

♡ 0

Edumotiva Lab 2mo

Joyypad



This a work in progress...a joyypad for controlling a game in Scratch!

♡ 0

Edumotiva Lab 2mo

Christmas artefact



In Christmas mood with the arduino-based Christmas tree.

♡ 0

Edumotiva Lab 2mo

3D printed traffic lights



This is an ongoing project. Maria, George and Anne work on the traffic light project. At the moment they have modelled and 3d printed the components of the traffic light. At a next stage the plan to work on electrical circuit making a final test.



FURTHER READING



4





WHAT A MAKERSPACE IS



WHAT A MAKERSPACE IS

"One trend in particular gets a lot of attention at the moment – in both branches: Innovation spaces with digital tool support, so-called makerspaces or fablabs (fabrication laboratories). These spaces and rooms for digital do-it-yourself tend to be a trending buzz. But I also see them as a promising development for learning and innovation. Creativity and innovation need space, tools and time. And by offering just that, fablabs and maker education have the potential to re-invent learning, too".

*Interview with Sandra Schön, retrieved online from:
<https://www.feedback.io/2017/05/23/interview-sandra-schoen/>*



Maker spaces could be perceived as efforts towards the spatialization of the principal ideas behind **Maker Movement**. Maker spaces – or FabLabs – were introduced in education during early 2000s due to emerging needs of turning teaching and learning processes into more experiential and real-world problem-solving based activities, while the basic concepts behind these infrastructures (i.e., making and digital fabrication), are based on "three theoretical and pedagogical pillars: experiential education, constructionism, and critical pedagogy" (Blikstein 2013: 4).

"Maker spaces are community-oriented workshops that engage learners in problem-solving through hands-on design and construction, oftentimes combining analog material with digital tools"

*Stefanie Panke, 2016, retrieved online from
<https://www.aace.org/review/make-a-maker/>*

Maker spaces promote among others the **DIY culture** and innovation, the **tinkering spirit** and the hands-on approaches paving the way to the production of more influencing educational methods regarding teaching and learning (Schon et al 2014: 86), while the activities hosted therein are oriented towards a more **free-form and interdisciplinary** way of learning driven by students' cognitive, technical and social-emotional skills (Grandi et al 2018: 407). Noteworthy, there is a **strong social aspect** around maker spaces. They are often described as gathering points of novices and experienced makers to work on real, relevant and personally meaningful projects, using new technologies and traditional tools, under the discrete guidance of mentors and experts.



Further reading: [Maker Movement](#)

- What is a makerspace: <https://www.makerspaces.com/what-is-a-makerspace/>
- The Maker Club Playbook:
https://youth.itabc.ca/wp-content/uploads/2016/09/ITA-Maker-Club-Teachers-Guide_web.pdf
- Youth Makerspace Playbook:
https://makedred.org/wp-content/uploads/2015/10/Youth-Makerspace-Playbook_FINAL.pdf
- Makerspaces:
Highlights of select Literature: <https://makedred.org/wp-content/uploads/2015/08/Makerspace-Lit-Review-5B.pdf>



WHAT MAKES A GOOD MAKERSPACE



TASK 1

WHAT MAKES A GOOD MAKERSPACE



What are the ingredients of a good maker space?
If you were to create and equip a new maker space for a school or library, how would your ideal solution look like?

"I would start by asking the children what they wanted to do in a maker space and how to get started. Ideally, we would travel to fablabs and a maker faire and visit other schools with maker spaces. As a teacher, I would collect and sort all kinds of stuff – waste, tools and random free. Add in free Wi-Fi and some computers, wood and a power screwdriver, and you are off to a good start. And of course I would share ideas with people from the MakerEd scene. I would build a lot myself and also let the children build parts of the environment. In the end, that's what making is all about!"

*Sandra Schon, retrieved online:
<https://www.aace.org/review/make-a-maker/>*

The quote presented above questioning while igniting possible conversation regarding makerspaces and the proper conditions that can lead to the creation of a good makerspace. Reflect upon your experience: If you were to give few tips to a fellow teacher/educator interested in creating a makerspace, what will these be?

Write here your thoughts

(a link to padlet will be available soon)

§ FURTHER READING

The quote of Sandra Schon revolves around makerspaces and the conditions that can lead to the creation of a good makerspace. For Schon the most important parameter is the participation and involvement of students to the entire procedure in a dynamic and direct way. They should be encouraged to express their thoughts and ideas concerning the activities that they expect to perform and materialize in a makerspace, as well as actively participating in the process of establishing and running the makerspace.

Another parameter that is highlighted is the makerspace equipment. For Schon the equipment should not necessarily be heavy or sophisticated.

Simple materials such as cardboards, paper cups or even wastes, and common equipment such as a laptop, some basic electronics and common tools (like a scissor or a screwdriver) can lead to setting up an inspiring place that fosters creativity and making. Therefore, it is argued that the type of space and the available equipment therein do not necessarily result to meaningful and inspiring learning experiences therein. A makerspace should primarily ignite and boost students' curiosity, enthusiasm and creative thinking.

<https://kappanonline.org/school-makerspaces-beyond-hype-classrooms-salisbury-nichols/>



MAKER MOVEMENT MANIFESTO



TASK 2

MAKER MOVEMENT MANIFESTO



Maker Movement manifesto brings together nine principles, namely Make, Share, Learn, Tool Up, Play, Participate, Support and Change, which all relate with the making process (Hatch in Schon et al 2014). In short, it is implied that it is through making that someone can learn, discover, improve her/his world, become social, share and ultimately express her/himself.

At your left hand side you can see the poster of the maker movement manifesto.

How these 9 principles are applied in your makerspace?

Did you face any difficulty applying these principles?

Please share your experiences here (link will be activated soon)

FURTHER READING

- Hatch, M. (2014) *The Maker Movement Manifesto: Rules for innovation in the new world of crafters, hackers and tinkerers*. Mc Graw Hill Education. Available online: <https://raumschiff.org/wp-content/uploads/2017/08/0071821139-Maker-Movement-Manifesto-Sample-Chapter.pdf>
- Vuorikari, R., Ferrari, A. and Punie Y. (2019) "Makerspaces for Education and Training: Exploring future implications for Europe". *EUR 29819 EN*, Publications Office of the European Union, Luxembourg, 2019. available online: <https://publications.jrc.ec.europa.eu/repository/handle/JRC117481>



“DO IT YOURSELF” & “DO IT TOGETHER”



TASK 3

“DO IT YOURSELF” AND “DO IT TOGETHER”

In recent years, a lot of research has been carried out on how makerspaces function as learning environments in formal and informal educational contexts. Makerspaces embrace the Do IT Yourself culture which is a vital aspect of making. But Do It Together is also a significant aspect that sometimes is not sufficiently boosted.



The Do It Together culture does not mean forcing the students to work together though. It neither means pushing everyone to do the same maker activity/ project. Teamwork is highly valued but it is equally important to ensure that the students decide are engaged in meaningful projects that reflect their personal interests and preferences; and it is this personal engagement that brings them authentically closer to fellow makers and connects them to the making community.

How can the “Do It Together” culture be meaningfully enhanced in your makerspace context?

Document your thoughts here (link to padlet will be activated soon)

FURTHER READING

- Makerspace Playbook:
<https://makered.org/wp-content/uploads/2014/09/Makerspace-Playbook-Feb-2013.pdf>



A QUICK GLIMPSE TO THE 21ST C. SKILLS



A QUICK GLIMPSE TO THE 21ST CENTURY SKILLS

21st century skills are considered the essential skill set necessary in the workplace of the 21st century. These skills go beyond Critical Thinking and Problem Solving including Citizenship, Collaboration, Communication, Creativity, Global Awareness, ICT literacy, Personal and Social Responsibility, and Problem Solving. Five of the most often identified 21st century skills in the context of makerspaces (either in schools or nonformal) as identified by teachers and/or makerspace facilitators are Collaboration, Creativity, Problem Solving, Social skills and Communication. These in-demand skill sets help to develop young minds for future success and makerspaces foster the development of those skills.

Collaboration



Collaboration is the essence of most parts of activities in these spaces, and the exchange of information is the way to learning. To create a project, it is necessary to discuss possibilities and obstacles, to share ideas, to manage the time, and functions of the team. You have to create frameworks through which the information can be distributed, either within teams or even across the makerspace.

Creativity



Makerspaces foster creativity and innovation through hands-on experimentation. Students have the opportunity to be creative and apply personalized learning strategies to make changes to existing concepts or develop their own ideas, methods or products. Makerspaces are designed to challenge students to create and learn through hands-on, personalized experiences throughout school years. Hands-on learning activities allow students to move from an abstract concept to a real-world understanding practicing on creating solutions to real-world problems.



- Output 1 ASSESSMAKE21 report: https://drive.google.com/file/d/1X2D02H-8Pr-xRgbbUmsMaKYffYph5Jd_J/view
- What Are 21st Century Skills?
Available at <https://www.aeseducation.com/blog/what-are-21st-century-skills>
- How Do You Define 21st-Century Learning?
Available at <https://www.edweek.org/teaching-learning/how-do-you-define-21st-century-learning/2010/10>
- Key Skills of Junior Cycle
Available at <https://ncca.ie/en/junior-cycle/framework-for-junior-cycle#panel4>
- Key Skills of Senior Cycle
Available at https://ncca.ie/media/3380/ks_framework.pdf



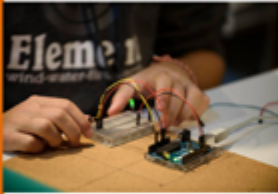
IN THE NEED FOR ASSESSMENT



IN THE NEED FOR ASSESSMENT

"There were at least 4 different making projects on in the makerspace at that time, digital and physical activity at the same time, individual and group work, role interchange, problems, failures, excitement and progress...it was almost impossible to evaluate what was going on and students' reflection on their skill-building"

facilitator B in the eCraft2Learn makerspace, Athens, 2018



Assessing student learning is critical because it can demonstrate whether educational activities are meeting their educational goals and its results may affect decisions about instructional needs and interventions. While standardized testing has dominated the assessment process in a traditional pedagogical framework, a makerspace is looking beyond statewide assessments to broader definitions and measures of student achievement, focusing on boosting 21st century skills. Teachers are rethinking assessment techniques looking to gauge student learning in real-time. But how can they recognize students' progress in developing 21st century skills and how they can support them?

Unlike the learning outcomes that are traditionally measured employing standardized tests, assessment of these higher order skills is not easy, particularly within the open-ended environments where students create unique solution paths to problems, interact with peers, and act in both the physical and digital worlds. In fact, teachers need to look beyond traditional assessment in order to include more innovative techniques to measure students' achievement. They need to have access to valid and reliable assessment instruments to recognize and support students as they develop these skills (Lai & Viering 2012).

Some teachers in a makerspace may seek to use rubrics to measure learning and development of skills beyond academic content knowledge; others may use (digital) portfolios to collect ongoing evidence of student learning. Yet, they all need support to collect data through the use of a (digital) tool that can provide useful and valuable insights so as to help them make evidence-based decisions to improve student learning and development of 21st century skills providing the necessary feedback.



TASK

Discuss/Think (?). What techniques do you employ to assess the development of those soft skills in a makerspace? (padlet)

- IO1 report available at: <https://www.assessmake21.eu/io1/>
- Assessment of General Capabilities: Skills for the 21st-century learner, Available at https://research.acer.edu.au/cgi/viewcontent.cgi?article=1049&context=ar_misc
- Assessment is More than Grading..., Available at <https://cft.vanderbilt.edu/assessing-student-learning/>
- Teaching 21st Century Skills Requires New Assessments, Available at <https://thejournal.com/articles/2018/11/01/teaching-21st-century-skills-requires-new-assessments.aspx>
- Are we assessing 21st century skills based on 20th century standards? Available at <https://bold.expert/are-we-assessing-21st-century-skills-based-on-20th-century-standards/>
- Interested in exploring how the assessmake21 tool was used for self-assessment in makerspaces in Cyprus, Greece, Ireland and Sweden? Check the Assessmake21 evaluation report: <https://www.assessmake21.eu/io4/>



REFERENCE LIST

- Lai, E. R., & Viering, M. (2012). *Assessing 21st Century Skills: Integrating Research Findings*. Pearson.
- Blikstein, P. (2013). Digital Fabrication and 'Making' in Education: The Democratization of Invention. In J. Walter-Herrmann & C. Büching (Eds.), *FabLabs: Of Machines, Makers and Inventors*. Bielefeld: Transcript Publishers.
- Schon, S., Kumar, S., & Ebner, M. (2014) "The Maker Movement Implications from modern fabrication, new digital gadgets, and hacking for creative learning and teaching". *eLearning Papers*. Special Edition. pp. 86-100
- Grandl, M., Ebner, M. & Strasser, A. (2018) "Setup of a Temporary Makerspace for Children at University: MAKER DAYS for Kids 2018". *Robotics in Education*. pp. 406-418
- Hlubinka M., et al (2013) *MakerSpace Playbook* available online at <https://makered.org/wp-content/uploads/2014/09/Makerspace-Playbook-Feb-2013.pdf> (last retrieved September 2021)



VIDEO LIST

- **Demonstration of the Assessmake21 tool:**
https://www.youtube.com/watch?v=EY4g62_yI-Q
- **Educator's Dashboard:**
 - Creating a classroom: <https://www.youtube.com/watch?v=51VplyxiffY>
 - Monitoring a classroom: https://www.youtube.com/watch?v=yh_bSHAplcs
- **The 3 Approaches:** <https://www.youtube.com/watch?v=GFIGYB65QhY>
- **Students' Dashboard**
 - Taking Challenges: <https://www.youtube.com/watch?v=BbbtTXswXul>
 - Requesting and Receiving a badge: <https://www.youtube.com/watch?v=l0jpca6kes0>
 - Portfolio, Examples and Definitions menu:
<https://www.youtube.com/watch?v=1aBty7KfEt8>
- **Implementation**
 - Inspiring making stories: https://www.youtube.com/watch?v=f-P_aBxDqz4
 - Using the tool in makerspaces setting: <https://www.youtube.com/watch?v=r7cSzgrOEh4>