Innovative Agile Project Based Learning



Agile2Learn Exploitation Guide Annex II Scenarios overview

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Obsah

Obsa	۱h	3
1. a pro	Agile2Learn Scenario: A step-by-step guide on how to design a classroom workshop bject entitled "How I imagine the Perfect Class" using agile methodologies"	or 5
1.1.	Purpose of the project	5
1.2.	Learning Objectives	5
1.3.	Related Learning Outcomes	6
1.4.	Pre-game	6
1.5.	The game	8
1.6.	Post- game	9
2.	Agile2Learn Scenario: Interdisciplinary Project for the creation of a digital tourist gui 10	le
2.1.	Purpose of the project	10
2.2.	Learning Objectives	10
2.3.	Related Learning Outcomes	10
2.4.	Pre-game	11
2.5.	The game	13
2.5.1 trave	Sprint-1: Means of public transport, ways of moving map with junction points ar el costs	d 15
2.5.2 tradi	 Sprint-2: Tourist accommodation and catering facilities. Commercial shops and tional marketplaces 	16
2.5.3	3. Sprint-3: Points of historical and cultural interest	17
2.5.4	8. Sprint-4: Indicative travel plan for points of interest	18
2.6.	Post- game	18
3. CAM	Agile2Learn Scenario: A STE(A)M project for "A STUDENTS' CLIMATE CHANGE	20
3.1.	Purpose of the project	20
3.2.	Learning Objectives	20
3.3.	Related Learning Outcomes	21
3.4.	Pre-game	22
3.5.	The game	24
3.6.	Post- game	27
4.	Agile2Learn Scenario: Interdisciplinary Project for the creation of a board game	31
4.1.	Purpose of the project	31
4.2.	Learning Objectives	31
4.3.	Related Learning Outcomes	32
4.4.	Pre-game	32

4.5.	The game	35
4.6.	Post- game	37

1. Agile2Learn Scenario: A step-by-step guide on how to design a classroom workshop for a project entitled "How I imagine the Perfect Class" using agile methodologies"

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- Panos Fitsilis, University of Thessaly
- Evangelia Boti, University of Thessaly

1.1. Purpose of the project

The purpose of the project is to make students imagine and define how a "perfect class" should be according to them.

Students will be divided into groups and each group will do its own research and it will identify the characteristics a perfect class should have. The topic is multidimensional, and each group can approach it from different perspective. For example, it can be approach from one or more perspectives such as:

- efficient class
- healthy class
- relationships between the students and teachers
- Quality of curriculum
- Encouragement and innovation
- Supportive environment
- Etc.

1.2. Learning Objectives

In this document, a practical project scenario is provided for those who want to practically apply agile learning at school. The learning objectives are:

- Development of the project vision and project strategy.
- Development of the initial set project requirements using user stories.
- Development of the core agile values and identification of agile methods and their usability and practicability.
- Learn about available tools, ways, and complex solutions for collaboration and digital collaboration.
- Produce a solution how to organize team collaboration based on the needs, resources available and desired outcomes.
- Learn communication mechanisms in classroom.
- Understand the meaning of agility within the context of teamwork.
- Highlight the distinct roles within agile teams.
- Development of effective decision-making practices that combine as many as possible viewpoints of team members.
- Development of the ability to think creatively.

- Development of solution selling skills.
- Develop critical thinking and creativity.
- Learn to provide and accept feedback.

1.3. Related Learning Outcomes

- 1. Select one or more agile methods for application based on the setup of the individual learning setting.
- 2. Prepare the implementation of the selected method(s) in the classroom through a creation of a teaching scenario using agile methods.
- 3. Understand the concept of user stories for capturing requirements.
- 4. Create the initial product backlog using user stories.
- 5. Understand how agile ceremonies are applied to a classroom environment.
- 6. Acknowledge the role and usability of various agile artifacts and ceremonies in the process.

1.4. Pre-game

This phase includes all the all the preparatory steps that should take place before the project implementation begins. These are:

- *Introduction*: Start by introducing the concept of Agile methodologies and explain how it will be applied to the specific project.
- **Team Formation:** In this step, students divided into small teams of 4-5 members each, ensuring a diverse mix of skills and personalities within each team. Teacher inspects the entire operation and do not encourage team formation based on personal relationships.
- **Define the Project**: The teacher presents the project and in collaboration with his/her students sets the objectives of the project as well as the evaluation criteria that will be used for the assessment of each team's results. At this stage brainstorming techniques can be used that motivate students and make them share their ideas in the class about their vision of a perfect class. The approach should not be too detailed but stay in a more abstract level mainly in defining the dimensions that define the perfect class. During this stage various tools can be used such as a whiteboard, or paper, or a digital tool suitable for brainstorming and teamworking.
- **Project inception:** Next each team, according to its vision about the project the project will define its strategy for the next step and will develop the initial project plan, as well as the initial set of project requirements that will lead to the creation of project backlog. Project requirements should have the form of "user stories".
- **Creation of the project Backlog:** A project backlog is list of requirements that each team should satisfy during project execution. If needed, it can be adjusted as the team moves through the project. The items on the backlog can be broken down into smaller tasks, and additional items may be added as needed. The goal is to keep the backlog flexible and responsive to the needs of the team.

A product backlog for this project can be based on the following general requirements and students can set more specific requirements for each item:

a. *Define what students mean by the term "Perfect Class.*" (To do this the team can conduct a survey of student preferences. As such a more detailed approach

in form of a user story can be "I want to conduct as survey among my colleagues to identify how they mean the 'perfect' class". The team will create a survey to gather data on what students consider to be the most important aspects of a perfect class. This action includes the steps of creating questionnaire, distribute it, collect the answers, and analyse survey results. Alternatively, interviews with students can also be done. The team will analyse the results of the survey and identify the key themes that emerged).

- b. Determine the key aspects of "Perfect class" as they emerged from students. (The team will determine e.g., through brainstorming ideas, how to create the perfect class based on the survey results.
- c. *Prioritize the ideas.* (The team will prioritize the ideas generated in the brainstorming session and select the most important ones to focus on. At this point students need to use time management aspects as well as prioritizing techniques. An interesting approach would be to use prioritization poker e.g.: https://airfocus.com/glossary/what-is-priority-poker/).
- d. Develop a plan for implementing the perfect class. (The team will create a plan according to their vision for the perfect class using materials such as paper, cardboard, whiteboards, or e-tools. Miro.com or canva.com are nice digital options.).
- e. *Present the plan to the rest of the class.* (The team will present their plan to the rest of the class and receive feedback. Modules of agile2learn pilot raining such as Selecting digital tools, and digital problem solving can be used as source for appropriate tools for this purpose).
- f. *Refine the plan according to feedback* (Based on the feedback received, the team will refine their plan and make any necessary changes).
- g. *Finalize the design of the plan* (The team will finalize the design of the perfect class and present it to the teacher).

The **Trello tool** can be used to support the **product backlog creation.** Since Trello tool is basically a general-purpose collaboration tool, the corresponding Trello template should be used. The configuration of the board should be done in such a way that there is a direct supervision of the pending and completed requirements. It is advised to create 4 basic lists:

- **1.** The Product Backlog that contains all the project requirements.
- 2. The Sprint Backlog which contains the requirements included in each sprint.
- **3.** The In Progress list which includes the Sprint requirements whose work is in progress.
- **4.** The Complete or Done list which contains the sprint requirements that have been completed.

Duration: 2-4 hours



Picture 1: The steps of the project

1.5. The game

The second or main game phase includes the "Sprint" phase, where is the phase the project is executed. This phase includes:

<u>Sprint Planning</u>: Teams will attend a sprint planning meeting, where they will prioritize the items on their estimate of the effort required to complete each task and agree on which tasks they will complete during the sprints, forming the Sprint backlog. Usually at least three sprints should be implemented. (More details about sprints can be found at the module Agile Ceremonies)

An example of the three sprint structure is the following:

Sprint 1:

Conduct a survey of student preferences.

Gather ideas for creating a perfect class.

Sprint 2:

Prioritize the ideas based on student feedback.

Develop a plan for implementing the top ideas.

Sprint 3:

Refine the plan according to feedback and adjust as needed.

Finalize the plan of perfect class.

<u>Sprint Execution</u>: Teams will begin working on the tasks agreed upon during the sprint planning meeting. They will hold daily stand-up meetings to share progress and identify any obstacles. <u>Dailly sprint</u>: Team members should have a quick (max 5 min) meeting at the beginning of each day during the sprit to discuss the progress and set the daily plan.

<u>Sprint Review</u>: At the end of the sprint, teams will review the work completed and demonstrate the results to the rest of the class.

Note: The acceptance criteria that must be met for a User Story to be accepted as completed have been set by the teacher at the beginning of the project. They reflect the requirements set by the teacher for students during the sprints. At the end of each sprint, the students' team must demonstrate the relevant knowledge that accumulated during the sprint. In the Figure below the Scrum process is presented.



Picture 3: Scrum process

1.6. Post- game

At the this or postgame phase a presentation of the entire project, and a general review (retrospective) take place. It is the phase where each team evaluates its performance, reflects on good or bad practices applied during the previous phases, identify good practices, and identify what competences they felt that developed of improved during the Sprints. Specifically, they can focus on:

- What have they learned (knowledge related to the subject they dealt with)?
- What have they learned from the process collaboration (emphasis on competencies)?
- Whether their collaboration improved from Sprint to Sprint.
- If not, what was at fault?
- What should have been done?
- What would they like to improve on (competencies)?

The evaluation criteria that we can take into account when applying the agile methods are the following:

- the active engagement
- the successful execution and fulfilment of the objectives
- the ability to solve problems and take initiative
- the development of social skills (dialogue, communication, collectivity, conflict management, etc.)
- the personal creative expression and integration of each student into the whole transformative learning and changing attitudes
- the evaluation of the results of the project by the students themselves

The above is an example outline of how the specific classroom project can be executed through the implementation of agile methods, but it is not the only alternative. Teachers can adjust the previous approach or use their own approach as long as they respect the steps of agile methodologies and follow the guidelines described within the modules offered in the pilot training of Agile2Learn project.

2. Agile2Learn Scenario: Interdisciplinary Project for the creation of a digital tourist guide

Authors:

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- Panos Fitsilis, University of Thessaly
- Vyron Damasiotis, University of Thessaly

2.1. Purpose of the project

The purpose of the project is to create digital tourist guides for two to five destinations (depending on the number of student teams at the class), with information that will include:

- Points of historical and cultural interest
- Tourist accommodation and catering facilities
- Commercial shops and traditional marketplaces
- Means of public transport, ways of moving map with junction points and travel costs

2.2. Learning Objectives

In this document, a practical project scenario is provided for those who want to practically apply agile learning at school. The learning objectives are:

- Development of the project vision and project strategy.
- Development of the initial set project requirements using user stories.
- Development of the core agile values and identification of agile methods and their usability and practicability.
- Learn about available tools, ways, and complex solutions for digital collaboration.
- Produce a solution how to organize team collaboration based on the needs, resources available and desired outcomes.
- Learn communication mechanisms in classroom.
- Understand the meaning of agility within the context of teamwork.
- Highlight the distinct roles within agile teams.
- Development of effective decision-making practices that combine as many as possible viewpoints of team members.
- Development of the ability to think creatively.
- Development of solution selling skills.

2.3. Related Learning Outcomes

- Select one or more agile methods for application based on the setup of the individual learning setting.
- Prepare the implementation of the selected method(s) in the classroom through a creation of a teaching scenario using agile methods.
- Understand the concept of user stories for capturing requirements.
- Create the initial product backlog using user stories.

2.4. Pre-game

After presenting the topic, use **brainstorming technique** to motivate your students and share their ideas in the class about the destinations they wish to work on, using a whiteboard, or paper, or a digital tool suitable for **brainstorming and teamworking**.

Present the project vision and strategy to the students and then develop the initial project plan, as well as the initial set of project requirements (**project inception**). Project requirements should have the form of "user stories".

From the teams and set clear goals for each team. Secondly, create a product backlog (**product backlog - agile artifacts**), by using user stories. You can use the **Trello tool** to create the **product backlog** Since Trello tool is basically a general-purpose collaboration tool, the corresponding Trello template should be used. Invite students to it so that they can access the collaboration environment and take over tasks. The organization of the board should be done in such a way that there is a direct supervision of the pending and completed requirements. Create 4 basic lists:

- The Product Backlog that contains all the project requirements.
- The Sprint Backlog which contains the requirements included in the current sprint.
- The In Progress list which includes the Sprint requirements whose work is in progress.
- The Complete or Done list which contains the sprint requirements that have been completed.

Duration: 2-3 hours



Picture 1: The steps of the project

Product backlog example

PRODU	CT BACKLOG REPORT				
ID	AS A	I WANT TO	SO THAT	PRIORITY	SPRINT
1	Trip organizer	List hotels	I can suggest the best of them to visitors	High	1
2	Visitor	Find points of historical interest	I can visit them	Medium	2
3	Visitor	Find points of cultural interest	I can participate in cultural events	Medium	2
4	Trip organizer	List Tourist accommodation and catering facilities	I can help visitors make their choices	Medium	1
5	Visitor	Find means of public transport and ways of moving map with junction points	I can move around economically and without wasting time	High	1
6	Trip organizer	List commercial shops and traditional market places	I can protect visitors from making the wrong purchases	Low	3
				Medium	0
				Medium	0

Picture 2: Initial Product Backlog with user stories for the tourist guide

- The acceptance criteria are a list of conditions that must be met in order for a User Story to be accepted as completed. They are set by the teacher at the beginning of the project. They reflect the requirements set by the teacher for students during the sprints. At the end of each sprint, the students' team must demonstrate the relevant knowledge that accumulated during the sprint.
- Every day the team should do a "Daily Scrum Meeting", where for each member of the Scrum team will report what they have done, what they are doing, what they will do during the day (their obligations) and the problems they faced.
- Sprint Planning is done prior commencement of each Sprint, Sprint Review is done at the end of the Sprint where the product owner (teacher) evaluates the work done and Sprint Retrospective that is done at the end of the Sprint, reflecting what was done nicely, what went wrong, and which work practices can be improved.
- In Sprint Planning toy will determine, in cooperation with the students, the topic of the current sprint, the tasks that students should curry out and define the acceptance criteria for the successful completion of the tasks.
- Pull items from the product backlog during the sprint planning session and create the initial sprint backlog. Then delegate ownership to others on their team. That means that each student takes the responsibility to implement one or more sprint backlog items.
- The student team should store all information in one shared space, usually using a collaboration tools (e.g., Trello) in order to streamline communication and create one central source of information.
- Only items in the Sprint backlog are in scope of each Sprint ensuring team members can focus on the correct tasks.
- While you can update/elaborate user stories the team is working on during the sprint, the backlog itself is protected and it shouldn't be altered during execution.

2.5. The game

EduScrum is a variation of the Scrum framework specifically tailored for educational institutions, such as schools and universities. The aim of EduScrum is to provide a flexible and adaptive approach to teaching and learning that can be applied to different subjects and educational levels. It emphasizes the importance of collaboration, continuous improvement, and student-centred teaching and learning.

In EduScrum, teachers and students are considered the development team, while the course objectives and outcomes serve as the product backlog. The teacher takes on the role of the Scrum Master and facilitates the process, while the students are responsible for delivering their learning goals. Regular meetings, such as Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective, provide opportunities for the teacher and students to reflect on their progress, plan their next steps, and identify areas for improvement. The goal of EduScrum is to create a more engaging and dynamic learning environment where students can take ownership of their education and collaborate with their peers to achieve their goals. In the Figure below the Scrum process is presented.



In the proposed educational project, there are four sprints. Each one of them has a specific objective, as it is presented in the Figure below.



Picture 4 : Scrum process including 4 sprints for the tourist guide.

2.5.1. Sprint-1: Means of public transport, ways of moving map with junction points and travel costs

Duration: 2 weeks

Task name	Assignee	Due date	Priority	Status	-
▼ To do					
Means of public transport	Ø	Today – Jan 31	Low	On track	
✓ Ways of moving up	8	Jan 30 – Feb 1	Medium	At risk	
Junction points and travel costs		Jan 31 – Feb 2	High	Off track	
 Doing 					
\odot					
\bigcirc					

Picture 5: Initial sprint backlog - example for the 1st Sprint

Sprint Review at the end of the 1st Sprint

Duration: 1-2 hours

- Team members discuss what went well during the Sprint, what problems they ran into, and how those problems were solved.
- Every team showcase its work and inspect the overall roadmap for the product (Product Backlog).
- The entire group collaborates on what to do next, so that the Sprint Review provides valuable input to subsequent to Sprint Planning.
- Tips from the teacher ahead of the next sprint.
- The result of the Sprint Review is a revised Product Backlog that defines the probable Product Backlog items for the next Sprint. The Product Backlog may also be adjusted overall to meet new opportunities.

Sprint Retrospective after the 1st Sprint and before the 2nd Sprint

Duration 1-2 hours

- It's conducted after the sprint is finished, and this means 'really finished', so after the sprint review too.
- Members inspect their ways of working during the last sprint and decide how they can improve during the next sprint.
- The team discusses:
 - What could be improved?
 - What will they commit to improve in the next Sprint?

In order to do that, one of the most common ways to structure a Sprint Retrospective is to have every team member answer the following questions:

• What went well?

- What did not go so well?
- What actions need to be taken to improve?

Sprint Retrospective vs Sprint Review (Difference)

- **Sprint review output:** updated product backlog with the top priority user stories for the development team to work on at the top.
- **Sprint retrospective output**: action list with specific steps to improve team ways of working during the next sprint.
- The **sprint review** is about the product, while the **sprint retrospective** is about the team.

2.5.2. Sprint-2: Tourist accommodation and catering facilities. Commercial shops and traditional marketplaces

Duration: 2 weeks

tourist guide 💿 🕸	\sim	Last seen
Add your board's description here See More		
G Main Table Kanban + − − − − − − − − − − − − − − − − − −		🖄 Int
New Task 🗸 🔍 Search 🛞 Person 🏹 Filter 🗸 🗘 Sort		

✓ Next week

Stuck / 1	Working on it / 2	Done / 1
Traditional market places 庄 …	Tourist \bigoplus ••• accomodations(hotels, resorts, campsites e.c.)	Catering facilities (
을 Status Stuck	Person	Person
🛱 Date Jan 30	冒 Status Working on it	를 Status Done
+ Add task	🛱 Date Jan 31	🛱 Date Jan 28
	Commercial shops 😥 •••	+ Add task
	Person	
	+ Add task	
	T AUU LOSK	

Picture 6: Sprint backlog for the 2nd Sprint - example

Sprint Review at the end of the 2nd Sprint Duration: 1-2 hours Sprint Retrospective after the 2nd Sprint and before the 3rd Sprint Duration 1-2 hours

2.5.3. Sprint-3: Points of historical and cultural interest

Duration: 2 weeks

New 1a	ask 🗸 🔍 Search 🛞 Person 🏹	7 Filter 🗸	🗘 Sort 🔇	ĕ Hide ····	
~ т	⁻ his week				
	Task		Person	Status	Date
	+ Aaa Iask				
✓ N	Next week Task		Person	Status	Date
✓ N□	Next week Task Ancient and historical monuments	Đ	Person	Status Working on it	Date Jan 31
 N I 	Next week Task Ancient and historical monuments Highlights	(±) (±)	Person	Status Working on it Done	Date Jan 31 Jan 28
 N N<	Next week Task Ancient and historical monuments Highlights Culture	€ €	Person Q Q Q	Status Working on it Done Working on it	Date Jan 31 Jan 28 Jan 30
 N N<	Next week Task Ancient and historical monuments Highlights Culture Activities	(±) (±) (±) (±) (±)	Person Q Q Q Q Q	Status Working on it Done Working on it Stuck	Date Jan 31 Jan 28 Jan 30 Feb 3

Picture 7 : Sprint backlog for the 3rd Sprint

Sprint Review at the end of the 3rd Sprint Duration: 1-2 hours Sprint Retrospective after the 3rd Sprint and before the 4th Sprint Duration 1-2 hours

2.5.4. Sprint-4: Indicative travel plan for points of interest Duration: 2 weeks

Working on it / 2	Stuck / 1	Done / 2
2nd and 3rd Day Scedule 🔶 🚥	4th and 5th Day 😥 😶	• 1st Day Scedule 🕀 •••
Person	Person	Person
冒 Status Working on it	E Status Stuck	≧ Status Done
🛱 Date Feb 17	🗄 Date Feb 21	🛱 Date Feb 10
Visits to museums and (+) •••• cultural resorts	+ Add task	Info about how to get in $(+)$ •••• your destination
Person		Person
冒 Status Working on it		⊟ Status Done
+ Add task		+ Add task

Picture 8: Sprint backlog for the 4th Sprint

2.6. Post- game

At the end, a presentation of the entire project, and a general review (retrospective):

- What have they learned (knowledge related to the subject they dealt with)?
- What have they learned from the process collaboration (emphasis on competencies)?
- Whether their collaboration improved from Sprint to Sprint.
- If not, what was at fault?
- What should have been done?
- What would they like to improve on (competencies)?

The evaluation criteria that we can take into account when applying the agile methods are the following:

- the active engagement
- the successful execution and fulfilment of the objectives
- the ability to solve problems and take initiative.
- the development of social skills (dialogue, communication, collectivity, conflict management, etc.)
- the personal creative expression and integration of each student into the whole transformative learning and changing attitudes
- the evaluation of the results of the project by the students themselves

In the plenary class, the teams complete their assignments. Each team has 10 minutes to present their work. All team members undertake to present a part of their work. At the end of the presentations, the students evaluate both the project as a whole and the level of cooperation between the members of each group.

The project evaluation can be carried out in two stages:

The teacher descriptively evaluates the performance of the students by observation during the tasks based on an evaluation sheet on a five-point scale (1-5) (1. Insufficient, 2. Weak, 3. Average. 4. Good, 5. Very good). The areas assessed are:

- understanding concepts knowledge of trends and sequences (individual assessment)
- students' critical ability (individual assessment)
- willingness to work active participation (individual assessment)
- taking initiative (individual assessment)
- cooperation (individual evaluation)
- social skills (communication, teamwork, conflict management) (individual assessment)
- the students' behaviour (individual evaluation)
- the originality and innovation of the work (group evaluation)
- the quality of work (group assessment)

In the first stage, individual skills will be evaluated and in the second stage, which will be done during the presentation of the groups' work, the group evaluation will be done. In this way, the evaluation does not acquire a comparative character, but is based on criteria arising from the learning objectives.

The evaluation of the project, as well as the entire process from the students' side, can be carried out in the form of a discussion after the presentation of the groups' work, thus contributing to the feedback of the whole class.

3. Agile2Learn Scenario: A STE(A)M project for "A STUDENTS' CLIMATE CHANGE CAMPAIGN

Authors:

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- Christos Pierrakeas, Hellenic Open University
- Achilles Kameas, Hellenic Open University

3.1. Purpose of the project

The purpose of this project is to develop a STE(A)M didactic proposal on climate change that also integrates an agile methodology approach. This project aims to provide students with a hands-on, experiential learning opportunity that emphasizes collaboration, innovation, and real world problem-solving. By leveraging an agile methodology, the project will encourage students to work in a dynamic, iterative, and flexible way, allowing them to respond to feedback and adapt to changing circumstances.

The project will include lessons on STEM and non-STEM Disciplines:

- Science (Climate change greenhouse effect),
- Technology (Renewable energy),
- Engineering (Solution Brainstorming),
- Arts (Language Arts/ media literacy & creative writing process, Environmental Arts/ Land Art & Eco Art or fine Arts/Artful thinking Routines), and
- Mathematics (Water Conservation measures & calculations).

The ultimate goal of the project is to foster students' deeper knowledge and understanding as well as their active citizenship and ability to take action on climate change issues in their local and "broader" community. Finally, students will empower their own and public participation and/or exercise of active citizenship and social change towards the needed adaptation and environmental protection.

Real life Questions:

- What is the climate change phenomenon and the greenhouse effect?
- What action can we take to combat the climate change?
- How may the Arts contribute to raise awareness and active citizenship to climate change?

Grade level: Middle or High School

Estimated Project Duration: 8-10 weeks (it can be adjusted accordingly to any class and duration)

3.2. Learning Objectives

In this document, a practical project scenario is provided for those who want to practically apply agile learning at school. The learning objectives are:

Development of the project vision and project strategy

- Development of the initial set project requirements using user stories
- Development of the core agile values and identification of agile methods and their usability and practicability
- Learning about available tools, ways, and complex solutions for digital collaboration.
- Producing a solution how to organize team collaboration based on the needs, resources available and desired outcomes.
- Learning communication mechanisms in classroom.
- Understanding the meaning of agility within the context of teamwork.
- Highlighting the distinct roles within agile teams.
- Development of effective decision-making practices that combine as many as possible viewpoints of team members.
- Development of the ability to critical thinking and creative audiovisual writing.

3.3. Related Learning Outcomes

a. On STEM Disciplines

Upon completion of this module, students will be able to: (Science)

- Understand the basic science of climate change, including the causes, impacts, and potential solutions.
- Analyse and interpret data and evidence related to climate change from multiple sources (scientific articles, reports, observations).
- Communicate scientific concepts and findings effectively to different audiences (teachers, parents, policymakers, community members).

(Technology 1)

- Understand the principles and applications of renewable energy technologies (solar, wind, hydro power or other).
- Analyse the environmental, economic, and social impacts of renewable energy systems/ compare them to conventional energy sources.
- Brainstorm ways to incorporate renewable energy into their Climate Change Campaign.

(Technology 2)

- Develop a website to effectively communicate the goals, information, messages, and activities of the climate change campaign.
- Use appropriate web development tools (Wordpress, Joomla, HTML, CSS, JavaScript, etc.) to create a user-friendly and interactive website.
- Evaluate the website's usability and accessibility based on the users' feedback.

(Mathematics)

- Collect and analyse climate change data from various sources (temperature records, sea level rise, carbon dioxide concentrations).
- Use statistical and mathematical models to analyse the trends and correlations of climate change data /make predictions about future climate change scenarios.
- Communicate the results of climate change data analysis using graphs and reports.

(Engineering)

- Apply design thinking process (problem solving, programming, etc.) to design and develop solutions to climate change challenges.
- Use various engineering tools and technologies, such as sensors, controllers, actuators, and simulations, to implement and test their solutions in real-world scenarios.
- Evaluate the effectiveness and efficiency of their solutions based on performance metrics and user feedback and iterate the design process accordingly.

b. On "Arts" or "non-STEM Disciplines"

Upon completion of this module, students will be able to:

(Environmental Arts)

- Create artwork (e.g., land art and eco-art) that raises awareness of the impacts of climate change on the environment and inspires action to mitigate them.
- Use various artistic media (paintings, videos, small movies), to express their views/messages of the climate change campaign.
- Collaborate with artists and stakeholders to create public art exhibitions, and events that engage, activate, and educate the community about climate change.

(Language Arts)

- Advance media literacy skills to critically analyse and evaluate the accuracy/ bias of climate change messages in different media sources (articles, social media, videos, news, etc.).
- Use creative writing/audiovisual skills to produce persuasive and informative texts (articles, speeches, scripts, social media posts, etc.) that convey the complexity of climate change and inspire people to take action.
- Adapt their writing style and tone to different audiences and purposes (informing, persuading, inspiring or other) and inspire active citizenship and participation.

c. On Agile Methodology

- Learn about agile methodology and its application in project management and problem-solving.
- Participate in a process that addresses a real-world problem, such as climate change.
- Develop effective communication skills and the ability to present their ideas and solutions to others.

3.4. Pre-game

This phase includes all the all the preparatory steps that should take place before the STE(A)M project implementation begins. These are:

1. Introduction of the topic of climate change to the students. This will be done through a presentation, <u>a video</u> or <u>a Climate Game</u> or any other visuals and examples that provide an overview of climate change, its causes and its effects. In this way, the team discover **the project vision**, the "North Star" of their project, that is to raise awareness of the local and

global community on how to mitigate the climate change effects through a Students Campaign!

2. Next, the students may brainstorm ideas for their project. They could come up with several ideas that will promote their goal, including creating a website, an app, videos, small movies, writing articles and making posters. They will prioritize their ideas based on their feasibility and potential impact and decide to create for example a website that could provide information (in all the forementioned ways) about climate change as well as offer tips for reducing for example one's carbon footprint.

3. The students will then be divided into teams and introduced the agile methodology, the scrum process, including its key concepts such as sprints, daily stand-ups, product backlog and retrospectives.

4. They will develop the initial project plan, as well as the initial set of project requirements (project inception), in the form of "user stories".

The Users in this STE(A)M project could be the following three categories:

- The *Students in High Schools* who are studying Science, Mathematics, Language, Technology and Fine Arts. The goal is to obtain a comprehensive understanding of climate change and its impact on the environment and human society as well as to take action to mitigate its effects. They are curious about the science behind climate change, as well as the ways in which human activity contributes to it. They want to be part of a grate Campaign about climate change impacts and solutions.
- The *Teachers of the above-mentioned specialties* have the goal to provide the students with the necessary resources and materials to teach them about climate change and its impact on the environment in an engaging and effective way.
- The *Local, Regional or Global Community* that will be interested to supporting the students' project and its goals. The goal is to get motivated and educated about climate change and the ways they may achieve active citizenship in supporting and reproducing the students' message.

The project will involve students working in teams and be assigned to specific roles, such as researcher, designer, presenter, reporter, etc.

Then, a draft **product backlog** will be created by using all user stories (Trello tool) (for example, Table 1).

		PRODU	JCT BACKLOG REPORT		
ID	AS	WANT TO	SO THAT	PRIORITY	SPRINT
Us1	Students	Research and learn about climate change - greenhouse effect	they take action to combat it	High	1
Us2	Science teacher	introduce climate change to students	the students understand its impact on the environment and human society	High	1
Us3	Math teacher	make data analysis	the students analyse global temperature trends & greenhouse gas emissions	Medium	4
Us4	Engineering teacher	Solution Brainstorming	they brainstorm potential solutions to mitigate climate change	Medium	5
Us4	Environmental Art teacher	facilitate students to	create artwork using natural material	Low	8
Us5	Language Arts teacher	promote their media literacy skills - critical	write articles, produce audio-visual texts (videos, movie) & promote their active citizenship	Medium	7

		thinking and creative writing skills			
Us6	Outreach: Activate community	engage in & support the students' program	raise awareness about the program and its goals- this could include social media campaigns, community events, or partnerships with local businesses	Medium	6
Us7	Technology teacher	introduce renewable energy sources	Research renewable energy sources- find ways to incorporate renewable energy into the campaign	Medium	3
Us7	Technology teacher	develop a website that provides the causes, the effects of climate change etc.	raise awareness about climate change in the local, regional or even global community by informing and offering ideas-tips for reducing climate change effects (through videos, articles and other students' artwork) and activate to participate in the students' campaign.	High	2
				~ ·	

Table 1. Initial Product Backlog _ A STE(A)M project for a Students' Climate Change Campaign

Before starting the game, the teacher of the corresponding specialty will introduce the learning outcomes of the specific lesson. Students will be divided into small teams, and each team will choose the specific topic they want to work on. The teacher will provide resources and guidance to help the teams research their chosen topics and reach the learning outcomes of the specific lesson each time.

The *steps of the project* are shown in the following Figure:



Figure 1. The steps of the project

3.5. The game

Edu Scrum is a variation of the Scrum framework specifically tailored for educational institutions, such as schools and universities. The aim of Edu Scrum is to provide a flexible and adaptive approach to teaching and learning that can be applied to different subjects and educational levels. It emphasizes the importance of collaboration, continuous improvement, and student-centred teaching and learning.

In Edu Scrum, teachers and students are considered the development team, while the course objectives and outcomes serve as the product backlog. The teacher takes on the role of the Scrum Master and facilitates the process, while the students are responsible for delivering their learning goals. Regular meetings, such as Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective, provide opportunities for the teacher and students to reflect on their progress, plan their next steps, and identify areas for improvement. The goal of Edu Scrum is to create a more engaging and dynamic learning environment where students can take ownership of their education and collaborate with their peers to achieve their goals.

In the Figure 2 the Scrum process is presented.



In the proposed STE(A)M project, there are eight sprints. Feel free to customize this list according to your project scope, class, and duration limitations.

1st Sprint - Science: Introduction to Climate Change (1st Week)

- Watch a video on climate change and discuss its causes and effects.
- Define key terms related to climate change, such as greenhouse gases and global warming.
- Conduct <u>a temperature experiment</u> to demonstrate the greenhouse effect.
- Students will create a "<u>Know- Want to learn Learned</u>" (KWL) chart to track their learning throughout this unit.

2nd Sprint - Technology: Develop a website (2nd Week)

- The students will create a prototype of their website, which will include information about the causes and effects of climate change, ways of reducing it.
- They test the website with their target audience (peers, community members) and receive feedback on how to improve it.
- Based on the feedback, the students make improvements to their website until they are satisfied with the final product.
- Finally, the students launch their website and share it with the community.

3rd Sprint - Technology: Renewable Energy (3rd Week)

- Introduce renewable energy sources and discuss their potential to reduce greenhouse gas emissions.
- Students will research different types of renewable energy and create a presentation on their findings.
- As a class, they will brainstorm on ways to incorporate renewable energy into their Climate Change Campaign.

4th Sprint - Math: Climate Change Data Analysis (4th Week)

- Students will research and gather data on global temperature trends and greenhouse gas emissions.
- They will graph the data using spreadsheets, Excel or other similar program and analyse the trends.

• Students will discuss the implications and correlations in the data, such as the correlation between increasing greenhouse gas emissions and rising temperatures and what it means for the environment.

5th Sprint - Engineering: Solution Brainstorming (5th Week)

- Students will brainstorm on potential solutions to mitigate climate change.
- They will be encouraged to think creatively and broadly, including technologies, policies, and individual actions.
- Students will organize their ideas into categories, such as energy efficiency, renewable energy, transportation, and land use.

6th Sprint - Outreach: Educate – Activate Community (6th Week)

- Students will develop a plan for reaching out to parents, community members and local /regional organizations to raise awareness about the program and its goals.
- They will implement their campaign by using technology to reach out to their target audience and educate them on the benefits of renewable energy.
- They will probably organize social media campaigns, community events or partnerships with local businesses, create, produce videos or podcasts, or host events and workshops.

7th Sprint – Language Arts: Media Literacy- Creative writing skills (7th Week)

- Students will advance their creative audiovisual reading and writing skills.
- They will discover how to become "Young Reporters" as they will learn to write articles for the phenomenon of climate change (e.g., a newspaper or a website article)
- They will prepare the scripts to produce audiovisual texts (e.g., video, small movies, podcasts) targeting the society's awareness raising about climate change adaptation and protection.
- They will promote their active citizenship and create presentations showcasing their proposed solutions and their impact on climate change.
- They will present the proposed solutions through their campaign and receive feedback.

8th Sprint - Fine Arts: Climate Change Impacts (8th Week)

- Students will explore different types of environmental art, such as <u>Land Art</u> and <u>Eco-Art</u>.
- They will create their own artwork using natural materials found outside, such as leaves, rocks and flowers.
- Students will discuss the significance of environmental art and its role in raising awareness about climate change.

Note: The number and duration of the sprints will depend on the scope of the STE(A)M project, the disciplines that will be connected, the students interests and the available timeline. So, the forementioned sprints and indicative activities are just an example and may vary based on the specific requirements of the class, the available teacher specialties, the available sources, etc. **The second or main game phase includes the "Sprint" phase**, where is the phase the STE(A)M project is executed. This phase includes:

Sprint Planning: At the beginning of each week the teacher of each specialty will work with the team to:

- define the scope of the sprint,
- identify the learning outcomes for the specific Discipline of the week,
- pick items/ tasks from the Backlog that are highest in priority level,
- decide who will be responsible for their completion,
- identify the learning outcomes for the specific Discipline of the week,
- outline the tasks that should be completed during each sprint,
- create a plan for achieving those outcomes.

<u>Daily Stand-up Meeting</u>: This is an essential characteristic of Agile Learning process as it keeps the team as a whole on track. Each day, the team has to "stand up" together for not more than 15 minutes, at the same time every day, and give a quick update about:

- Teams' progress on the day before.
- Any obstacles/roadblocks that may be preventing progress.
- Any guidance and support they probably be needed.

The daily Stand-Up is not for discussions or decisions. If there is a need for something like this, then another separate meeting should be organized with the members of the team that have to deal with the certain issue.

<u>Sprint Review</u>: At the end of each week, the team will:

- present their work to the class and the stakeholders,
- demonstrate any completed work to them,
- review the progress made /evaluate whether they have achieved the goals,
- gather and use feedback on their progress,
- reflect on their learning (based on the feedback), and
- make any necessary adjustments/improvises to their approach.

<u>Sprint Retrospective</u>: At the end of each week, the teacher of each specialty will:

- lead a reflection session with the team to identify:
 - what worked well,
 - what didn't work and,
 - what could be improved in the next week.

This will allow the team to continuously improve their approach and achieve their learning outcomes more effectively.

Note: The acceptance criteria -that must be met for a User Story to be accepted as completed- have been set by the teacher of each specialty at the beginning of the STE(A)M project. The students' teams reflect the requirements set by each specialty's teacher for them during the sprints. At the end of each sprint, the students' team must demonstrate the relevant knowledge that accumulated during the sprint.

3.6. Post- game

At the third or postgame phase a presentation of the entire STE(A)M project, and a general review (retrospective) take place. It is the phase where each team evaluates its performance, reflects on good or bad practices applied during the previous phases **at all Disciplines implementation**, identify good practices and identify what competences they felt that **developed or improved** during the Sprints. Specifically, they can focus on:

- What have they learned (knowledge related to the subject they dealt with)?
- What have they learned from the process collaboration (emphasis on competencies)?

- Whether their collaboration improved from Sprint to Sprint.
- If not, what was at fault?
- What should have been done?
- What would they like to improve on (competencies)?

The evaluation criteria that we can take into account when applying the agile methods are the following:

- the active engagement
- the successful execution and fulfilment of the objectives
- the ability to solve problems and take initiative.
- the development of social skills (dialogue, communication, collectivity, conflict management, etc.)
- the personal creative expression and integration of each student into the whole transformative learning and changing attitudes
- the evaluation of the results of the STE(A)M project by the students themselves

An Alternative assessment option through a Rubric

The following example of a Rubric Assessment of the above STE(A)M Project _ "A Students' Climate Change Campaign" could be an alternative proposal for the students' teams assessment process in the STE(A)M project that presented by an agile methodology.

Assessment Scoring: Each category will be scored on a scale of 0-4, with 4 being the highest score. The total score will be the sum of the scores from each category, with a maximum possible score of 36. The Following (Table 2) is an example outline of how the specific classroom STE(A)M project can be executed through the implementation of agile methods, but it is not the only alternative.

Note: Teachers can adjust the previous STE(A)M approach or use their own approach as long as they respect the steps of agile methodologies and follow the guidelines described within the modules offered in the pilot training of Agile2Learn project.

Table 2. An Assessment Rubric for the STE(A)IVI Project: "A Students"							
Climate Change Campaign "							
		1	2	3	4		
Category	Criteria: The students	Minimal evidence of meeting criteria	Adequate evidence of meeting criteria	Good evidence of meeting criteria	Excellent evidence of meeting criteria		
1. Science	1.Demonstrate understanding of climate change and its causes.						
(Introduction	2. Identify the key environmental issues related to climate change.						
Change)	3. Make use of scientific evidence to support and communicate arguments.						
2. Technology	1. Make use of appropriate technology to develop a website that is engaging and informative.						
(Develop a website)	2. Make effective use of multimedia to convey information						
	3. Have a clear and organized presentation of website usability, accessibility from users and stakeholders.						
3. Technology	1. Demonstrate their understanding of renewable						
(Renewable	energy sources and their benefits.2. Make use of technology to						
спегдуј	design & implement a plan for incorporating renewable energy in the campaign.						
4. Math (Climate	1. Use effectively mathematical models to analyze climate change data.						
Change Data Analysis)	2. communicate in a clear manner their findings and conclusions.						
	3. Correlate their finding to possible solutions for reducing the climate change impact.						
5.	1. Demonstrate understanding of land art and eco-art						
Environmenta	2. Use Arts to convey environmental messages						
Arts	3. Use the Art in an Original and creative way, create public art exhibitions, and events that engage and educate the community about climate change.						

6.	1. Make effective use of creative writing to convey information and ideas	
Arts (Media Literacy Creative Writing Skills)	2. Use media literacy to critically evaluate sources of information.	
	3. Make use of creative and engaging audiovisual writing ways (podcasts, videos, etc.)	
	4. Adapt their writing style and tone to the different audiences and purposes (informing, persuading, inspiring or other.	
7. Engineering	1. Design and implementation of solutions to environmental problems related to climate change.	
	2. Use of engineering principles to create innovative solutions.	
8. Outreach	1. Demonstrate effective outreach strategies to raise public	
(Raise Awareness)	 Make a clear communication of the campaign's goals and objectives 	
	3. Present evidence of successful outreach efforts.	
	1. Include team working based on agile methodology guidelines.	
9. Agile	2. Facilitate the identification of STE(A)M project requirements - product backlog	
es (implementati	3.Allow and encourage self- organized teams.	
on,	4.Encourage and facilitate the identification criteria of completion for students' work and evaluation.	
	5. Include the opportunity to organize at least 3 sprint cycles.	
	6. Create the sprint backlog - what they will implement in each sprint.	
	7. Encourage students to reflect on their activities after each sprint and at the end of the whole process and record their findings.	

4. Agile2Learn Scenario: Interdisciplinary Project for the creation of a board game

Author:

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4.1. Purpose of the project

The purpose of the project is to create a playable board game. For the creation of this board games, agile methods and tools shall be used.

There are many different types of board games that students could develop using agile methods. Here are some examples of board game themes that could be used:

I. Strategy game: A game that challenges players to make strategic decisions and outmanoeuvre their opponents. Examples include Settlers of Catan, Risk, or Diplomacy.

II. Cooperative game: A game where players work together to achieve a common goal, such as solving a mystery or surviving a disaster. Examples include Pandemic, Betray at Baldur's Gate, or Forbidden Island.

III. Trivia game: A game that tests players' knowledge on a specific topic or theme, such as history, science, or pop culture. Examples include Trivial Pursuit, Jeopardy, or Wits & Wagers.

IV. Party game: A game that is easy to learn and fun to play with a group of people, such as charades, Pictionary, or Cards Against Humanity.

V. Adventure game: A game that involves exploration, discovery, and risk-taking, such as Dungeons & Dragons, Betrayal at Baldur's Gate, or Betrayal Legacy.

VI. Educational game: A game that teaches players about a specific subject, such as math, science, or geography. Examples include Math Maze.

4.2. Learning Objectives

In this document, a practical project scenario is provided for those who want to practically apply agile learning at school. The learning objectives are:

- Development of the project vision and project strategy
- Development of the initial set project requirements using user stories
- Development of the core agile values and identification of agile methods and their usability and practicability
- Development of project management skills: Students will learn how to manage a project using agile principles, including how to create a product backlog, prioritize user stories, plan sprints, and track progress.
- Learn about available tools, ways, and complex solutions for digital collaboration.
- Produce a solution how to organize team collaboration based on the needs, resources available and desired outcomes.
- Understand the meaning of agility within the context of teamwork.

- Development of effective decision-making practices that combine as many as possible viewpoints of team members.
- Development of the ability to think creatively.

4.3. Related Learning Outcomes

The learning outcomes of a board game development project using agile methods can be diverse, and they will depend on the specific game theme, the project scope, and the objectives set by the teacher or the project stakeholders. However, here are some general learning outcomes that can be achieved through a board game development project:

- I. Creativity and innovation: Students will learn how to come up with unique and original ideas for their board game, taking inspiration from other games or creating something entirely new.
- II. Planning and organization: Students will learn how to plan the development of their board game, break it down into manageable tasks, and prioritize those tasks based on user feedback and team goals.
- III. Communication and collaboration: Students will learn how to work effectively in a team, communicate their ideas, give and receive feedback, and solve conflicts.
- IV. Problem-solving and critical thinking: Students will learn how to identify problems or limitations in their game design and use critical thinking to find solutions or workarounds.
- V. User-centred design: Students will learn how to put the user at the centre of their game design, conducting user research, and incorporating feedback to create a game that is fun and engaging to play.
- VI. Prototyping and testing: Students will learn how to create a prototype of their board game, test it with users, and iterate on the design based on feedback.
- VII. Presentation and storytelling: Students will learn how to present their board game in a clear and engaging way, showcasing its features, and telling a compelling story about how the game is played.

4.4. Pre-game

- ✓ Introduce students to the basic concepts of game design, including mechanics, rules, and game components. This can help students develop a common understanding of the project and build excitement for the upcoming board game development project.
- Team Formation: Help students form teams based on their skills and interests. It is important to ensure that each team has a diverse set of skills, including game design, art, programming, writing, and project management.
- Scrum Training: Conduct a scrum training session to introduce students to the agile methodology, including scrum roles, ceremonies, and artifacts. This can help students understand how to work together in an iterative and collaborative way.
- ✓ Ideation Session: Conduct an ideation session where each team brainstorms and develops several game ideas. This can help students generate a range of game concepts that they can evaluate and refine later in the project.

- ✓ User Research: Conduct user research to understand the needs and preferences of the target audience for the game. This can help students design a game that is engaging and fun to play.
- Product Backlog Creation: Help students create a product backlog that includes all the features and requirements for the board game. This can help students prioritize their work and plan their sprints effectively.
- Present the project vision and strategy to the students and then develop the initial project plan, as well as the initial set of project requirements (project inception).
 Project requirements should have the form of "user stories".
- ✓ Form the teams and set clear goals for each team. Secondly, create a product backlog (product backlog agile artifacts), by using user stories. You can use the Trello tool to create the product backlog. Since Trello tool is basically a general-purpose collaboration tool, the corresponding Trello template should be used. Invite students to it so that they can access the collaboration environment and take over tasks. The organization of the board should be done in such a way that there is a direct supervision of the pending and completed requirements.
- ✓ Create four basic lists:
 - The Product Backlog that contains all the project requirements.
 - The Sprint Backlog which contains the requirements included in the current sprint.
 - The In Progress list which includes the Sprint requirements whose work is in progress.
 - The Complete or Done list which contains the sprint requirements that have been completed.

Duration: 2-3 hours



Picture 1: The steps of the project

Example user stories for the product backlog:

- As a player, I want the game to be challenging, but not too difficult, so that I can enjoy playing it.
- As a player, I want the game to have clear rules and instructions, so that I can understand how to play the game.
- As a player, I want the game to have a well-designed game board and game components, so that the game is visually appealing and easy to use.
- As a player, I want the game to have interesting and varied game mechanics, so that I can experience different challenges and strategies while playing the game.
- As a player, I want the game to have a good balance of luck and skill, so that I can have fun playing the game, regardless of my level of skill.
- As a player, I want the game to be suitable for my age group and skill level, so that I can play the game with my peers and have a good time.

The user stories indicate what the project team needs to think of while working on the project. For the development of a board game, you should consider the following:

Game Mechanics:

- Define the game mechanics (how the game is played, objectives, scoring, etc.).
- Design the game board and game pieces.
- Develop the rules and instructions for the game.
- Determine the number of players and playing time.

User Interface:

- Create game artwork (board design, card design, game pieces, etc.).
- Create the graphic design of the game components.
- Develop a user-friendly interface for the game.

User Experience:

- Conduct user research to understand the target audience.
- Define user personas.
- Identify and incorporate feedback from playtesting sessions.

Game Components:

- Determine the game components required (dice, cards, tokens, etc.).
- Design and produce the game components.
- Test and refine the game components.

4.5. The game

EduScrum is a variation of the Scrum framework specifically tailored for educational institutions, such as schools and universities. The aim of EduScrum is to provide a flexible and adaptive approach to teaching and learning that can be applied to different subjects and educational levels. It emphasizes the importance of collaboration, continuous improvement, and student-centred teaching and learning.

In EduScrum, teachers and students are considered the development team, while the course objectives and outcomes serve as the product backlog. The teacher takes on the role of the Scrum Master and facilitates the process, while the students are responsible for delivering their learning goals. Regular meetings, such as Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective, provide opportunities for the teacher and students to reflect on their progress, plan their next steps, and identify areas for improvement. The goal of EduScrum is to create a more engaging and dynamic learning environment where students can take ownership of their education and collaborate with their peers to achieve their goals. In the Figure below the Scrum process is presented.



In the proposed educational project, there are six sprints. Feel free to customize this list according to your project scope and limitations.

Sprint 1:

- Define the game mechanics and objectives.
- Develop the initial game board and game pieces.
- Create the first version of the rules and instructions.
- Identify the target audience and user personas.

Sprint 2:

- Conduct playtesting sessions to gather feedback.
- Refine the game mechanics and objectives based on feedback.
- Update the game board and game pieces.
- Revise the rules and instructions based on feedback.

Sprint 3:

- Develop the game components (dice, cards, tokens, etc.).
- Test and refine the game components.
- Incorporate feedback from playtesting sessions.
- Plan for the graphic design of the game components.

Sprint 4:

- Create the graphic design of the game components.
- Integrate the game components with the game board and game pieces.
- Conduct additional playtesting sessions to test the integration.
- Refine the game mechanics and objectives based on feedback.

Sprint 5:

- Develop a user-friendly interface for the game.
- Conduct user research to understand the target audience.
- Update the game components based on user research and feedback.
- Prepare the game for distribution (packaging, instructions, etc.).

Sprint 6:

- Conduct final playtesting sessions to ensure the game is ready for release.
- Develop a marketing plan for the game.
- Determine the distribution channels for the game.
- Launch the game and gather feedback from players.

It's important to note that the number and duration of sprints will depend on the scope of the project and the timeline available. The above sprints are just an example and may vary based on the specific requirements of the project.

Sprint Review at the end of every sprint

Duration: 1-2 hours (can be done quicker depending on the duration of the sprint).

- Team members discuss what went well during the Sprint, what problems they ran into, and how those problems were solved.
- Every team showcases its work and inspects the overall roadmap for the product (Product Backlog)
- The entire group collaborates on what to do next, so that the Sprint Review provides valuable input to subsequent to Sprint Planning
- Tips from the teacher ahead of the next sprint

• The result of the Sprint Review is a revised Product Backlog that defines the probable Product Backlog items for the next Sprint. The Product Backlog may also be adjusted overall to meet new opportunities.

Sprint Retrospective after the sprints

Duration 1-2 hours

- It's conducted after the sprint is finished, and this means 'really finished', so after the sprint review too.
- Members inspect their ways of working during the last sprint, and decide how they can improve during the next sprint.
- The team discusses:
 - What could be improved?
 - What will they commit to improve in the next Sprint?

In order to do that, one of the most common ways to structure a Sprint Retrospective is to have every team member answer the following questions:

- What went well?
- What did not go well? What was impeding the progress?
- What actions need to be taken to improve?

Sprint Retrospective vs Sprint Review (Difference)

- Sprint review output: updated product backlog with the top priority user stories for the development team to work on at the top.
- Sprint retrospective output: action list with specific steps to improve team ways of working during the next sprint.
- The **sprint review** is about the product, while the **sprint retrospective** is about the team.

4.6. Post- game

At the end, a presentation of the entire project, and a general review (retrospective):

- What have they learned (knowledge related to the subject they dealt with)?
- What have they learned from the process collaboration (emphasis on competencies)?
- Whether their collaboration improved from Sprint to Sprint.
- If not, what was at fault?
- What should have been done?
- What would they like to improve on (competencies)?

The evaluation criteria that we can take into account when applying the agile methods are the following:

- the active engagement
- the successful execution and fulfilment of the objectives
- the ability to solve problems and take initiative.
- the development of social skills (dialogue, communication, collectivity, conflict management, etc.)
- the personal creative expression and integration of each student into the whole transformative learning and changing attitudes

• the evaluation of the results of the project by the students themselves

In the plenary class, the teams complete their assignments. Each team has 10 minutes to present their work. All team members undertake to present a part of their work. At the end of the presentations, the students evaluate both the project as a whole and the level of cooperation between the members of each group.

The project evaluation can be carried out in two stages:

The teacher descriptively evaluates the performance of the students by observation during the tasks based on an evaluation sheet on a five-point scale (1-5) (1. Insufficient, 2. Weak, 3. Average. 4. Good, 5. Very good). The areas assessed are:

- understanding concepts knowledge of trends and sequences (individual assessment)
- students' critical ability (individual assessment)
- willingness to work active participation (individual assessment)
- taking initiative (individual assessment)
- cooperation (individual evaluation)
- social skills (communication, teamwork, conflict management) (individual assessment)
- the students' behaviour (individual evaluation)
- the originality and innovation of the work (group evaluation)
- the quality of work (group assessment)

In the first stage, individual skills will be evaluated and in the second stage, which will be done during the presentation of the groups' work, the group evaluation will be done. In this way, the evaluation does not acquire a comparative character, but is based on criteria arising from the learning objectives.

The evaluation of the project, as well as the entire process from the students' side, can be carried out in the form of a discussion after the presentation of the groups' work, thus contributing to the feedback of the whole class.









