



## **O4: LEARNML TEACHER TRAINING REPORT**



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## PROJECT FACT SHEET

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LearnML

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**Overview**

LearnML project transfers the notion of AI literacy to primary and secondary education and aims to introduce students to the core principles of AI and ML through a uniquely designed game-based educational toolbox. Students will also learn how disinformation and biases may be intertwined with training ML algorithms and how the response of machine learning may be interpreted in real life problems. Specifically, the core objectives of the project are to:

- i) Design an Artificial Intelligence (AI) and Machine Learning (ML) framework within the primary and secondary educational context in Malta, Greece and Norway.
- ii) Implement a game-based learning toolbox that realises Machine Learning training scenarios (games and game authoring tools).
- iii) Produce relevant and effective material for course development based on gameful machine learning activities.
- iv) Educate teachers through games and game authoring tools in an engaging manner to train students to reflect creatively on AI ethics, data biases and societal implications.
- v) Widely involve students in machine learning training courses that include playful game-based learning activities so that they become AI literate but most importantly responsible citizens of Europe with regards to the ethics and threats of Artificial Intelligence

## Project Coordinator

University of Malta (UM)  
Prof. Georgios N. Yannakakis  
Phone: +35 623404503  
E-mail: Georgios.yannakakis@um.edu.mt

## Consortium Members



University of Malta, Malta  
(coordinator)



National Technical University  
of Athens (NTUA), Greece



Norwegian University of  
Science and Technology,  
Norway



**SCIENCE CENTRE**

Science Center, Pembroke  
Malta



KORAIS Educational  
Enterprises SA (PALLADIO),  
Greece

## Web & Social media

Web Site: <http://learnml.eu/>

YouTube:

<https://www.youtube.com/channel/UC7oVV5tPzvQ5RIF2MAqRVtA/featured>

Facebook:

<https://www.facebook.com/learnmachinelearn/>

Twitter: @Learn\_to\_ML

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<b>Consortium partners contributing</b>	Iro Voulgari (UM), Sofia Papavlassopoulou (NTNU), Desiree Scicluna Bugeja (Science Center)
<b>Main authors</b>	Ilias Stouraitis (PALLADIO)
<b>Reviewers</b>	Iro Voulgari (UM)
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## Executive Summary

The objective of O4 is to test and validate the LearnML method and courses developed in the LearnML Guidebook (O3) for primary and secondary school teachers in participating countries. This outcome involves the deployment of a professional development and innovation course curriculum, addressed to teachers, school leaders and teacher educators to be used in European continuing professional development to promote and support teaching and learning of ML and AI concepts, principles, and implications in primary and secondary school education leveraging the idea of game-based learning.

The course will use the LearnML Guidebook in order to approach through hands-on and reflection sessions the principles of machine learning through playful activities. At the same time, this procedure will introduce the basics of curriculum development and will explore teacher education curriculum design principles. Dedicated pilot training courses will target primary and secondary school teachers from Greece, Malta and Norway.

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## 1. Introduction

The “Learn to Machine Learn” (LearnML) project is a three-year Strategic Partnership in the field of Education aiming to produce an innovative solution for the teaching and learning of crucial 21st century skills relating to digital literacy, computational thinking, Artificial Intelligence (AI) and Machine Learning (ML), so that Europe’s children and teenagers can develop into responsible citizens and insightful thinkers able to navigate the complex digital space and effectively contribute to its design.

During LearnML Output 4, the partners conducted several workshops with teachers from primary and secondary education. The participants’ ideas and concerns about Artificial Intelligence and Machine Learning were recorded. The consortium developed a network of stakeholders and particularly educators, so as to engage in reflective discussions through meetings and workshops during the Teacher Training phase of the project. The Teacher Training report describes the process, the results and the findings of the teacher training phase, and the materials and resources used to further refine the teacher training procedure and process. The teacher training reports from the three partner countries where teacher training workshops were conducted, are integrated in this report in order to present a comparative study and share insights and conclusions.

## 2. Designing the Teacher Training Courses

Due to the COVID-19 restrictions, we had to shift to an online format for the teacher training courses. For this purpose, we had to rethink and adjust the process, material, and activities accordingly. Even though this restricted the hands-on participation and the interactions among trainers and participants (primary and secondary education teachers), we found that it allowed for a higher participation of teachers from various, and even remote areas of the partner countries.

For the design of the teacher training courses, we further considered the findings and insights from previous LearnML events, and specifically the focus groups, workshops and Info Days (E events) conducted so far, and particularly during the IO1.

Therefore, our main goals and considerations for the design of the teacher training courses were:

- Enhance and support the participants' knowledge and understanding of AI and ML regarding the technical aspects, the ethical, social, and personal implications, and everyday life applications of AI
- Guide them to the design of relevant lesson plans, considering the existing curricula and also their students' background and interests
- Provide them with resources they can readily use in their classes such as games, reading material, online tools, examples of applications
- Promote discussions and the development of communities of practice, for the exchange of good practices or challenges
- Listen to the teachers' insights, needs, requirements, concerns, and consider them for the design of the material as well as for our suggestions for the implementation of AI education in formal education curricula

After our initial Teacher Training Course design, focus groups and a pilot course were conducted with primary and secondary education teachers from the Palladio school, in Greece, as one of the LearnML project partners. This allowed us to adjust our course design considering the teachers' insights about online training, their needs, and the introduction of AI-related concepts and themes (Image 1).

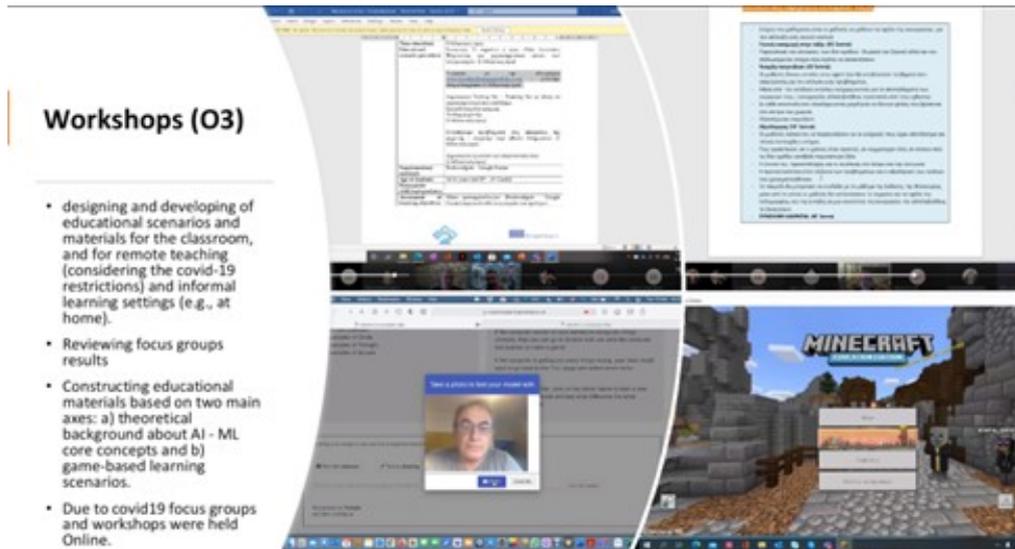


Image 1: Workshops with primary and secondary teachers

### 3. Teacher Training Course Design: Version 1

The first version of the course design had the following structure and content:

- 1) **Artificial intelligence and Machine Learning theory and examples:** Presentation of AI and ML concepts and processes. The participants are introduced to the meaning of AI, examples of applications, concepts of ML such as Supervised Learning, Reinforcement Learning, algorithms, training data, and testing data, using educational material developed in the framework of IO3. For research purposes and also for assessing the effectiveness of the course, the initial perceptions and previous experience of the participants regarding AI and ML would be recorded, using functionalities such as a shared whiteboard or the chat channel of the online platform.
- 2) **Educational scenarios about AI/ML:** Presentation of indicative educational scenarios (lesson plans) of AI education, developed in the framework of IO2, and discussion with the participants. Scenarios for primary and secondary education are presented to the teachers. The scenarios constitute the basis for a semi-structured discussion with the participants regarding the structure of the scenario, the learning goals, the relevant learning subjects, their potential for use in the classroom, possible adjustments that need to be made, links to existing curricula, relevance to their students' background and interests. The goal of this session is to familiarise the teachers with the design of educational scenarios and school activities for AI education, as well as to provide insights on the opportunities and challenges for the integration of AI literacy in formal education settings.

- 3) **LearnML games:** Participants are introduced to the LearnML games developed in the framework of IO2, such as the “ArtBot” game. The games aim to teach concepts of Supervised Learning and Reinforcement Learning. The participants evaluate the content of the game and the learning outcomes by playing it, but they also discuss how they can use it in their classrooms.
- 4) **Design educational scenarios based on games and AI applications presented:** Teachers work in groups (e.g., breakout rooms in Zoom) and design their own lesson plans and educational scenarios. A template of an educational scenario is given to the groups. Participants can freely present their own ideas to their groups.
- 5) **Discussion and Assessment of the Educational Scenarios designed:** In the last phase of the course the groups get back from the breakout rooms and present their scenarios to other groups. The participants discuss and propose adjustments

### Testing the Teacher Training Course

We tested the first version of the teacher training course design in online workshops conducted during the Athens Science Festival. We advertised the event through an open call by emails or posts to social media (see Image 2).

The Athens Science Festival is one of the prestigious and popular science events for teachers and students in Greece. This event was held online from 27 to 29 of March 2021 due to the Covid-19 situation and the students, teachers, and the general public have the opportunity to explore scientific and technological advancements in an entertaining, innovative and interactive manner. The 2021 “Athens Science Festival” theme was “The era of heros” and several researchers, distinguished scientists, educators and artists communicated science concepts and trends. Artificial Intelligence was one of the major topics in this festival.

The LearnML project partners organised two training workshops for teachers (and a parallel session for students). Each training workshop lasted two hours and more than 65 teachers registered for these events.

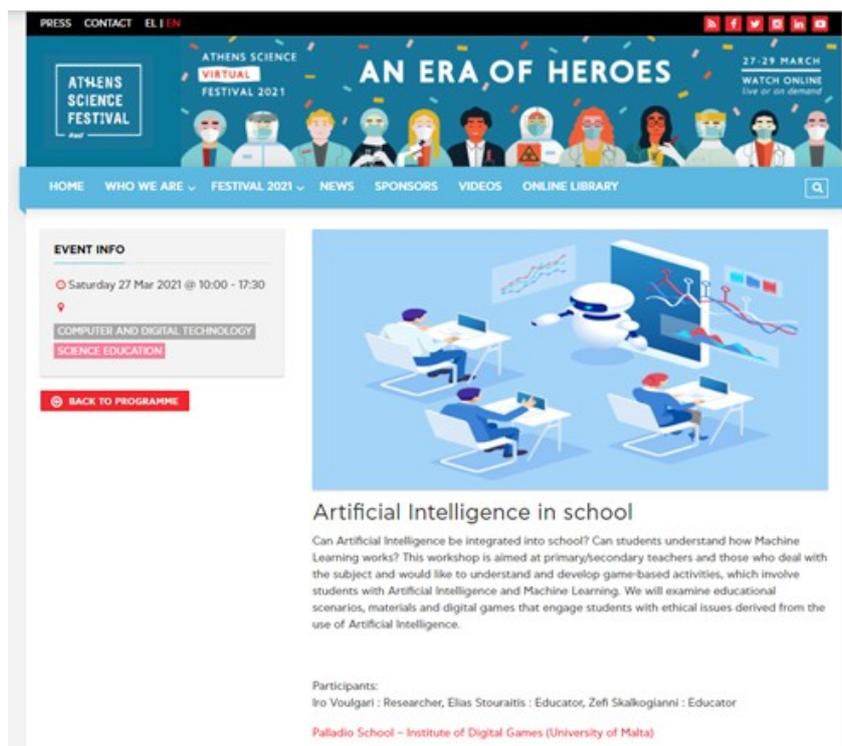


Image 2 The open call for the LearnML training during Athens Science Festival.

During the first training workshop 32 teachers and during the second one 23 teachers from primary and secondary education participated. We applied the course design presented in the previous section. The majority of the participants were Computer Science teachers but there were some teachers from science education, linguistics and arts. In the initial discussion about their perceptions of AI applications and significance, they highlighted the significance of Artificial Intelligence in their lives, but they could not express a specific definition of the term except of teachers who had studied computer science. These teachers were able to describe specific examples of AI applications such as search engines, Alexa engine, the Netflix Algorithm, smartphones applications, online recommendation systems and autonomous vehicles.

We, then presented the relevant theory on AI and ML, through an online presentation with several examples, applications and videos, such as the Teachable Machine (<https://teachablemachine.withgoogle.com/>) project Palmo etc. Teachers made questions and they seemed to be willing to learn more about how machines learn. We discussed their questions which were focused on how machines learn from the data and how the quality of the data used by the AI systems designers impact the quality of the AI models developed. Another application that attracted the interest of the participants and triggered discussion was "The Moral Machine" by MIT (<http://moralmachine.mit.edu/>). This triggered discussion about Reinforcement Learning and autonomous cars, as well as the ethical implications and dilemmas emerging. Secondary education teachers found it interesting, and they highlighted the importance of discussing it very carefully with their students. The

primary educational scenario discussed involved the game “AI for Oceans” (<https://code.org/oceans>) which introduces children to the process and implications of Supervised Learning. Teachers found it easy to use in their classrooms and some teachers from secondary education reported that they can use it for their early years of secondary education.

Following our teacher training programme, teachers played the “ArtBot” game so as to familiarize with the meaning of Supervised and Reinforcement Learning through this game and understand these two subcategories of Machine Learning. Teachers evaluated the game as easy to use in their classrooms. Especially teachers who play games and know how a game provides a learning outcome reported that they would use it in their classrooms. . Teachers who were not related to computing find it useful as well but some of them wanted more information on how they can use it in their classrooms.

After this step, participants were separated into breakout rooms in order to create their own scenario but this was not easily to happen because of the online situation and also because of the fact that each participant had a different background. As such, we discussed only their general ideas. They focused on the general AI understanding for their classrooms. As a follow up, we created and sent to the participants an online package including background information and existing educational scenarios developed in the framework of O3. We asked the participants to study the material and send us feedback.

## 4. Revising the Teacher Training Course Design (version 2)

The first test of the teaching training procedure gave us feedback of what teachers prefer during an event like that and how we can recreate some parts of the training content so as teachers familiarize more with the educational scenarios and how they can use them in their classrooms. The main problem was their active engagement of creating new content of what they have already understood from the training. We discussed the difficulties of doing it in such a short time but more than one session is very demanding for teachers during a pandemic crisis based on their opinion. We made again some discussions from Palladio School and LearnML partners and we concluded a new form of teacher training.

The new teacher training programme contained the following protocol:

1. **A 4-minute welcome to participants:** teachers are asked to complete the Intro Survey (Gender, Years of teacher experience, Specialty/Field, their AI expertise (a five point scale))
2. **Explore Teachers' Perceptions of AI:** Teachers answer the follow questions online:  
How would you describe what Artificial Intelligence is?  
Do you use any AI applications?
3. **Presentation of Theory by researchers:** there are four different parts during this part of presentation and the researchers follow the next steps:
  - 3a. **Presentation of AI applications:** Using the presentation, we present examples of AI and ML applications e.g., recommendation systems, voice and image recognition applications, search engines, personalised information in newsfeeds and social media, and self-driving cars
  - 3b. **Defining AI and ML:** We present the definitions, features, elements of AI and ML e.g. reinforcement learning, supervised learning, training dataset, testing dataset, learning rate, use experience, Exploration, Rewards, labelling (data)
  - 3c. **Social, cultural, and ethical implications of AI and ML:** We present potential issues e.g. for self-driving cars, filter bubbles, disinformation
  - 3d. **AI in education:** We present examples of applications, software, games for AI for students e.g Teachable Machine
4. **Group Session 1: Playing Games for AI:** Participants are separated into groups (e.g. 6 members/group) In groups, participants play the ArtBot game and the NTUA games  
ArtBot: <http://learnml.eu/games.php>

Evolutionary cars/ Flappy Bird <http://83.212.75.23/>

**5. Main Room Discussion:** Debriefing about the games played: All participants return to the Main Room and talk about the games. Meanwhile, organiser sends the game evaluation form links.

**6. Group Session 2: Adapting an Educational Scenario:** It is recommended that participants work in groups, using a shared document for each group. If, for practical reasons, e.g. limited time, this is not possible, they may work individually using a premade google form with the same questions as the example below. Our goal is to discuss how AI and ML education can fit in existing Curricula in different countries. Therefore, it is necessary for participants to mention their learning goals based on the curriculum of their country.

Participants are separated into groups (e.g. 6 members/group) - different or the same groups as with the previous activity. They are given 2 scenarios from the book below and are asked to adapt it for their students/ classes.

The main questions are: Which scenario would you use in your classroom? What changes would you do in order to adapt it in your classroom (please write your teaching subject, curriculum objectives, the country you teach in).

Camilleri, V., Dingli, A., & Montebello, M. (2019). AI in Education: A Practical Guide for Teachers and Young People. Department of AI, University of Malta.  
[http://learnml.eu/docs/AI\\_in\\_Education.pdf](http://learnml.eu/docs/AI_in_Education.pdf)

**7. Main Room Discussion:** On the adaptation of the scenarios: The groups present their adapted scenarios. Discussion on the scenarios presented in a general session.

**8. Group Session 3: Designing an Educational Scenario:** Participants are separated into groups (e.g. 6 members/group) - different or the same groups.

Each group designs a scenario for the classroom - if participants are in different teaching fields, then interdisciplinary scenarios. They will have to use one of the LearnML games, and other applications if needed. Each group writes in a dedicated google doc.

Note to the organisers: One of the project goals is to see how AI and ML education can fit in existing Curricula in different countries. So do remind the participants to mention their learning goals based on the curriculum of their country.

It is recommended that participants work in groups, using a shared document for each group. If, for practical reasons, e.g. limited time, this is not possible, they may work individually using a premade google form with the same questions as the example below.

**9. Main Room Discussion: On the design of the scenarios:**

Participants return to the Main Room. The groups present their scenarios and evaluate others based on the learning goals and learning procedure.

### 10. Explore Change in Teachers' Perceptions of AI

Participants will answer the questions they answered before the

Questions: How would you describe what Artificial Intelligence is? Do you use any AI applications?

**11. Conclusions (Closing remarks):** Participants are asked to comment/assess the workshop - write their comments in the chat or use voice. Participants are asked to complete the Form of Participation (for the Certificate of Attendance, and the Project)

### Follow Up questions for focus groups and interviews

For in-depth insights on how the workshop went, it is recommended you conduct interviews or Focus Groups with teachers who participated (2-3 people), after the workshop or the next few days. The main question is: What did they think of the workshop?

Questions of Interviews:

- 1 Do you believe that the workshop's goal was clear?
- 2 Was it easy for you to understand the meaning of AI/ML during this workshop?
- 3 Which game did you find easy to use in your classroom?
- 4 Do you believe that games are useful for teaching AI/ML in your classroom?
- 5 Do you believe that educational scenarios can be used in your school classroom and how?
- 6 How do you think that you might engage students with AI/ML in your teaching classroom?
- 7 What were the positive and the negative aspects of the workshop? What did you like and what would you change?

## 5. Implementing the Teacher Training Courses: process and findings

### Greece

The LearnML Teachers' Training was organized by the Palladio School in collaboration with the Institute of Digital Games, University of Malta and hosted by the 3rd Secondary Education Office in Attika, Greece. There were 115 initial registrations and 75 participated in this webinar including teachers from secondary education. Their teaching subjects involved not only programming but also science, philology, art, mathematics, biology and chemistry. There were more women than men. Most of them were teachers in public schools. The majority of the teachers had more than twenty years of teaching experience and only four participants had less than ten years. We followed the protocol of the teacher training as we described above.

Most of the participants were not familiar with the notion of Artificial Intelligence or they had a medium knowledge of the content due to the fact that most of them are philologists or language teachers. Their first answers about the description of Artificial Intelligence were vague and superficial while few of them gave very specific examples in terms of Artificial Intelligence such as automated cars or robots. The participants were very active during the theoretical presentation and they found very useful the idea of understanding the theoretical content through several examples and especially through the AI and ML applications. The participants discussed the ethical implications of Machine Learning and Artificial Intelligence procedures. The example of the automated cars and the ethical implications incited the interest of the participants.

The participants played the LearnML games and they evaluated the content and the learning procedure. They found them very interesting, and they focus on the environment of the museum and how easily they can introduce students to the content of Machine Learning. Most of the participants had a standard knowledge of games and that was a good point of understanding the significance of using them in education. The difficulty of the teaching procedure was that even if teachers commented on the given educational scenarios, they could not complete the task of creating their own. After the teacher training workshop, three teachers sent their educational scenarios. At the end of the teacher training procedure, they answered again the first questionnaire and they concluded that they can describe the meaning of Artificial Intelligence and they can give more examples for AI, such as Alexa, search engines and so on.

### **Challenges for the Implementation of AI and ML education in Formal Education**

The interviews with some of the participants based on the teacher training protocol highlighted the significance of introducing AI/ML in education not only in computing but also in social sciences and connecting to ethical issues (philosophy, linguistics, history and so

on). They also proposed some projects during the lesson of skills workshops (Ergastiria drasthriothton) in greek Curriculum. They expressed that the main problem is how they can collaborate with other teachers (for example: philologists and informatics) due to the fact that the Greek educational system is restricted to such ideas. They also are afraid of the fact that the greek system is dedicated to exams in secondary education and they have to be careful about how they will apply a new lesson plan in their classrooms. Finally, they found the games as a very good method for doing so.

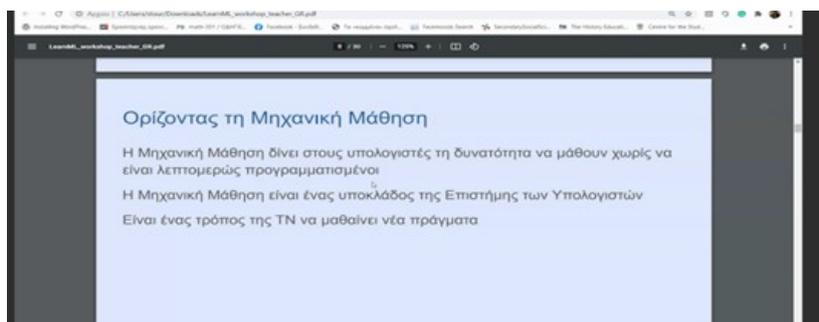


Image 3 Online Teacher training workshop in Greece

### “LearnML – Teachers’ Training” webinar (Malta)

The LearnML Teachers’ Webinar was organized by the Science Centre within the Directorate for Learning and Assessment Programmes (DLAP). There were 43 initial registrations and 22 participated in this webinar including a good mix of teachers and other individuals from the educational field coming from the state and non-state sectors. The majority of the participants were women and their teaching subjects included computing, physics, economics, biology and social studies. Most of them had a school experience of ten years and only three up to twenty years. This session deviated slightly from the original time-schedule as approximately 45 minutes were dedicated to the presentation of main concepts, processes and examples of AI to ensure that participants received an overview of the theory, before proceeding to the hands-on part of the webinar (i.e. games and educational scenarios).

Concerning the participants’ initial views on AI, which were recorded through the shared whiteboard (Padlet) the metaphor of the human brain and intelligence seemed to be a popular one. Specifically, the participants wrote that machines try to have “human-like” intelligence or that machines are programmed by humans. Other interesting opinions were those who believed that AI is a computer programme that solves and simulates human senses and behaviour and those who explain the AI procedure: “computers gather huge amounts of data and come up with solutions which are difficult for humans to come up with answers.

After the session, the participants wrote that they received a general overview on what AI incorporates, they learnt more about the meaning of reinforcement learning and they understood how education can be linked to Artificial intelligent notion. In addition, they

noted that they found the applications they used during the training workshop very interesting and helpful. The participants showed their enthusiasm when they wrote down that AI/ML applications and games are necessary to facilitate in school implementation. Some of them indicated that English or Mathematics need to be fully met using the AI tools. The participants made reflective comments on how they can use the educational scenarios in their classrooms. Some of them wrote that they can create some problem-solving tasks with rewards and punishments and they prefer making their content of the educational scenario as simple as they can. They also believe that teachers have to understand very well the terms and the applications before they use them in their own classrooms.

As can be observed from the resources gathered, teachers did not yet feel prepared to incorporate AI concepts into their teaching practice. Besides the limited time available during the webinar, more emphasis on AI in education, readymade examples / scenarios / lesson plans that target specific curricular learning outcomes, and knowledge about AI per se, including the differences between Supervised, Unsupervised and Reinforcement Learning are required to further instill the need to transmit AI concepts with our students and to encourage teachers into aligning their pedagogy and teaching resources accordingly. A detailed handbook that accompanied the presentation used during the webinar, and the presentation were sent after the webinar to all participants.

## Challenges for the Implementation of AI and ML education in Formal Education

Some challenges for Malta are outlined below:

- Lack of public policy for AI in education: Such a policy would provide guidelines to support innovative ecosystems to nurture opportunities of AI in the field of education.
- Investment in AI research to establish a national academic centre of excellence in AI, scholarships and research network.
- A major challenge is the professional preparation of teachers/educators for AI powered education.
- Ethics and transparency - there are certain societal and ethical concerns to be addressed while implementing AI. Data privacy and security is the immediate question that comes up in any discussion regarding data ethics. The challenge lies in using personal data while ensuring the protection of individual privacy preferences and personally identifiable information.

### Norway

During the online presentation in total 42 participants were present. In addition, the materials were disseminated to more than 200 students (i.e. teachers from all Norway who attend a programming course offered to them by NTNU). Norwegian teachers face the

change of Curricula in the last months, and they are interested in learning and adapting new materials but at the same time they are very stressed about applying new learning material.

The course offers programming as a subject, and provides insight into how it can be used to create digital solutions. This course is the basis for the students (i.e. teachers) who have the opportunity to take a follow up course which focuses on how programming can be communicated to school students with a focus on creativity and collaboration in problem solving. This course was a great change for teachers who are interested in Artificial Intelligence and Machine Learning and they prefer familiarize the content of these notions. Teachers' learning background was not focused only on programming but also on English, math, science and arts. Most of them were inexperienced about the AI/ML notions and they expressed that at the beginning of the project. Many of them had one or two years of experience but they had never used the AI/ML notions in their classrooms.

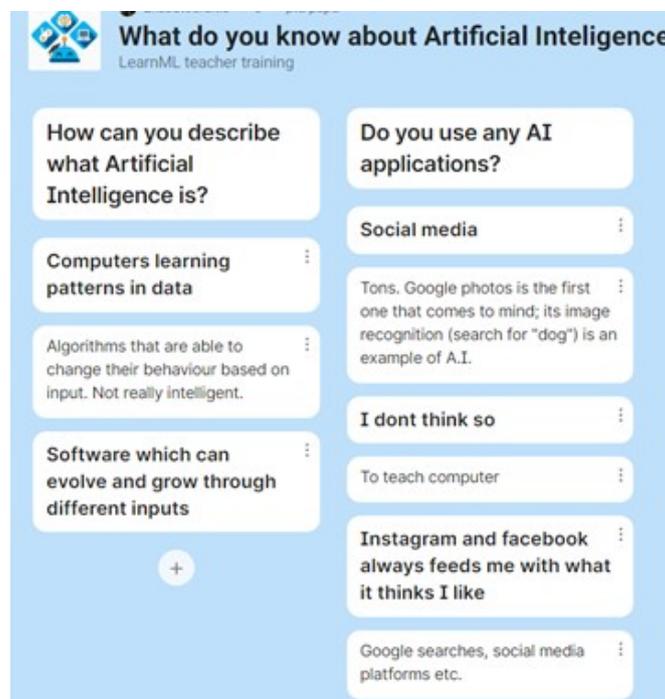


Image 4 Participants answers from the first questionnaire

## Challenges for the Implementation of AI and ML education in Formal Education

In Norway the Ministry of Education published a strategy that began in 2017, offering coding as an elective subject in lower secondary school (Ungdomsskole, Grades 8–10, ages 13–16), which became a permanent elective subject beginning in 2019. Since then, in a similar direction, revisions of the curricula have happened with key features to strengthen digital skills, programming, and technology in all grades. With respect to that, different efforts from organizations (e.g., Universities) offer courses for teachers for primary school to upper secondary level to help them understand how they can work with programming in their

subjects based on the competence goals. Most often (but depends on the school), apart from the option of the subjects Information Technology 1 and / or Information Technology 2 in the upper secondary schools in Norway, the requirement from the curricula in primary and lower secondary schools is to have digital competence and programming as part of mathematics, science, music and arts and crafts and for upper secondary levels it is for mathematics and science. This is both an opportunity and a challenge to introduce AI/ML activities for students. It is an opportunity as there is space for new activities in relation to AI and ML with teachers who aim to find engaging and interesting activities for their courses, but at the same time it is a challenge as the teachers lack competence and most probably AI/ML are faced as more advanced for their classes and students. However, with proper training and support with materials for the teachers, together with concrete scenarios that are flexible with many alternative options for activities (e.g., as one time activity for an academic hour, or as self-study as part of a lab hour) and with option to integrate them in different standard curricula subjects, there is more potential for them to try it.

## 6. Discussion and Conclusions

Comparing the data from each country, teachers from primary and secondary education in each country do not feel comfortable with the terms of Machine Learning and Artificial Intelligence. They familiarised with the AI content from the teacher training material, but they need more time to create their own learning activity. This means that educators need additional educational support, material and reflective discussion when they will apply their educational scenarios. As such, the C1 teacher training event focuses on this need. In Greece, the interest in teacher training came from different learning backgrounds (mathematics, sciences, philologists, arts, informatics). We noticed the same in Norway and Malta, but their learning background was focused on ICT and informatics.

Some proposals for the implementation:

- use simple and understandable scenarios for teachers in each country in order to trigger them to use them in their classrooms.
- understandable learning goals for students based on the age group
- use game-based methodology to familiarize students with the learning goals
- easily connect learning activities with each country Curriculum so as to improve the idea of implementing Machine Learning and Artificial Intelligence in each learning subject.

## Appendix (materials from teacher training)

### A. Selected presentation materials

## What is Machine Learning;



Machine learning is a branch of artificial intelligence and focuses on applications that learn from experience.

The machine learns from data and improves its accuracy over time without being programmed to do so.

Machine Learning is a subfield of Computer Science

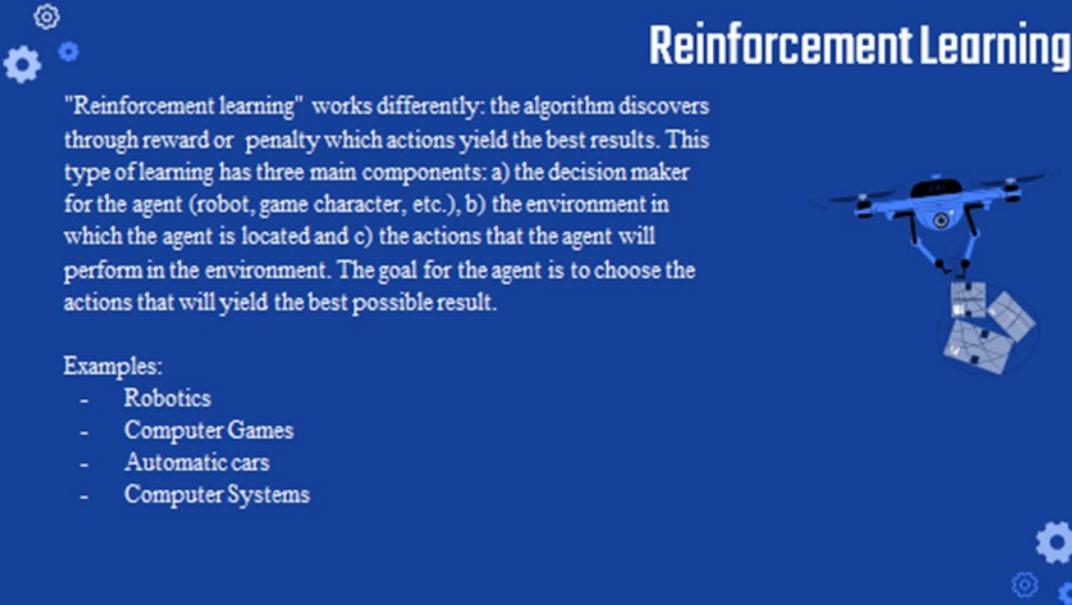
## Supervise Learning

"Supervised learning" is using labelled or structured data so as machine improve the ability to make predictions and decisions for new unseen data. Human input is essential because they choose which data the machine will receive in order to make decisions for the unseen data.

Examples:

- Face recognition
- Emails' spam recognition





## Reinforcement Learning

"Reinforcement learning" works differently: the algorithm discovers through reward or penalty which actions yield the best results. This type of learning has three main components: a) the decision maker for the agent (robot, game character, etc.), b) the environment in which the agent is located and c) the actions that the agent will perform in the environment. The goal for the agent is to choose the actions that will yield the best possible result.

Examples:

- Robotics
- Computer Games
- Automatic cars
- Computer Systems

## B. Game and Application List

Let's play the LearnML games!

Artbot	<a href="http://learnml.eu/games.php">http://learnml.eu/games.php</a>
Evolutionary Flappy Bird	<a href="http://83.212.75.23/">http://83.212.75.23/</a>
Evolutionary Cars	<a href="http://83.212.75.23/">http://83.212.75.23/</a>
Minecraft learns ML	<a href="http://learnml.eu/games.php">http://learnml.eu/games.php</a>
Super Meat Bot	<a href="http://learnml.eu/games.php">http://learnml.eu/games.php</a>



Let's experiment with games and applications about AI/ML!

AI for Oceans	<a href="https://code.org/oceans">https://code.org/oceans</a>
Teachable Machine	<a href="https://teachablemachine.withgoogle.com/">https://teachablemachine.withgoogle.com/</a>

Learning Machine for kids	<a href="https://machinelearningforkids.co.uk/">https://machinelearningforkids.co.uk/</a>
Moral Machine	<a href="https://www.moralmachine.net/">https://www.moralmachine.net/</a>
Mitsuku	<a href="https://www.pandorabots.com/mitsuku/">https://www.pandorabots.com/mitsuku/</a>
Semi-Conductor	<a href="https://semiconductor.withgoogle.com/">https://semiconductor.withgoogle.com/</a>
Thing Translator	<a href="https://thing-translator.appspot.com/">https://thing-translator.appspot.com/</a>
Quick Draw	<a href="https://quickdraw.withgoogle.com/#">https://quickdraw.withgoogle.com/#</a>

### C. Let's make an educational scenario!

Here, you can design your own educational scenario. Try to be as descriptive and analytic as possible particularly in the educational procedure and steps section.

Don't forget to add links to any material you may use in your scenario (e.g. games, webpages, videos)

Add your name too so that we know you are the author of the scenario. Let us know if you prefer to publish your name as the author of the scenario, if we use the scenario in our published material, or if you'd rather remain anonymous.

<b>Name and expertise of the author of the educational scenario:</b>	(add your name, surname and expertise e.g. primary education teacher, history teacher, math teacher)
<b>I agree to the publication of my name as the author of this scenario:</b>	Yes, keep my name as the author of the scenario, if the scenario is published.  No, you can publish the scenario but keep it anonymous.
<b>Title</b>	Choose a suitable title for your educational scenario/activity

<b>Subject (s)</b>	e.g. Mathematics, History. It can be more than 1 subjects (interdisciplinary)
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**Learning Objectives**

Please, think which from the following learning objective (s) is/are suitable for your educational scenario/activity and feel free to add learning objectives based on your subject (s):

Understand the process of supervised learning:

- students are introduced to the concepts of the training dataset,
- testing dataset,
- classification,
- labelling, image recognition,
- decision trees,
- prediction accuracy

Understand the role of these elements in the architecture and behaviour of an AI system.

Understand the process of reinforcement learning:

- students are introduced to the concepts or rewards and penalties,
- learning duration,
- learning rate, exploration,
- exploitation,
- pathfinding.

Understand the impact of the decisions made during the design and programming of an AI system on the behaviour and output of the AI system.

Reflect on the concept of algorithmic bias and understand how human values and bias may define the behaviour of AI applications.

Trigger reflection and discussions on the impact of the behaviour of an AI system on everyday life situations e.g., face recognition, autonomous vehicles.

Please, also consider competencies and skills, such as:

computational

algorithmic thinking

digital literacy skills

<b>Connected to the learning objectives of Curriculum</b>	<p>Please, think about how your educational scenario may connect to the curriculum of the subject (s) you chose.</p> <p>Add relevant learning goals from the Curriculum</p>
<b>Type of educational scenario</b>	<p>Which of the following describes best your scenario?</p> <ul style="list-style-type: none"> <li>● short activity in the classroom</li> <li>● educational scenario (multiple activities) for the classroom</li> <li>● short activity for online teaching</li> <li>● educational scenario (multiple activities) for online teaching</li> <li>● activities for students to do at home (alone or with their parents)</li> </ul>
<b>Teaching approach</b>	<p>Please, describe briefly the idea of your scenario/activity (Pedagogically, methodologically e.g. project-based, flipped classroom, constructivist approach)</p>
<b>Time (duration)</b>	<p>e.g. 20 min, 40' min, 2 teaching hours etc.</p>

<b>Educational scenario procedure</b>	<p>Please, describe in detail how you think that you can achieve your learning goals with your educational; scenario/activities.</p> <p>An example:</p> <p>Introduction</p> <p>step by step actions</p> <p>choosing a game and why</p> <p>time for each step</p> <p>teacher aids in each step</p>
<b>Supplementary materials</b>	<p>Do you believe that teachers need supplementary material? Please describe and present</p> <p>Some examples:</p> <p>Detailed worksheets</p> <p>online worksheets</p> <p>a game or games</p> <p>URLs or videos</p> <p>etc.</p>
<b>Age of students</b>	<p>e.g. 10-11 years old etc.</p>
<b>Prerequisite abilities/experience</b>	<p>e.g. Do the students need ICT specific skills?</p> <p>Do they need to know about a term?</p>

<b>Assessment of learning objectives</b>	<p>How do you think that you can assess the learning objectives of your scenario/activity?</p> <p>Some examples:</p> <ul style="list-style-type: none"><li>● Gameplay assessment</li><li>● educational scenario assessment (questionnaires, interviews, debates, rubrics, team assessments over learning goals...)</li><li>● reflective</li><li>● formative assessment, self-assessment, peer assessment,</li><li>● teacher's assessment, assessment by character</li></ul>
<b>Assessment of activity/ies</b>	<p>How would you assess if your educational scenario/activity is successful?</p> <p>Please, describe how you will assess the scenario/activity</p>