FACILITATE-AI

GUIDELINES FOR FACILITATING THE LEARNING OF ARTIFICIAL INTELLIGENCE BY SCHOOL STUDENTS OF GRADES 7-12

RESULT 2

TRAINING COURSE FOR FACILITATORS OF LEARNING IN AI

STEAME EDUCATION

ISBN 978-9963-713-51-6

Co-funded by the European Union

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FACILITATE – AI: Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

R2: Training Course for Facilitators of learning in AI-STEAME education

www.facilitate-ai.eu

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FACILITATE – AI:
Guidelines for facilitating the learning
of Artificial Intelligence (AI) by School Students of Grades 7-12

RESULT 2.
TRAINING COURSE FOR FACILITATORS OF LEARNING IN AI-STEAME EDUCATION

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(EN) INTRODUCTION

In recent years Artificial Intelligence (AI) is increasingly entering all spheres of our lives and, of course, education. Curriculum and teaching aids are developed on various AI topics in different subjects, classes and forms of education; tools are created that, with the help of AI, are able to influence learning and the achievement of learning goals. For the realization of these tasks, packages of strategic documents have been created at the world, European and national level concerning the study of AI in all degrees and forms of education. As AI is currently a key priority for the EC and as indicated in the "White Paper on Artificial Intelligence" (WPAI-EU, 2020) given the global competition, a solid EU approach is needed, which will build on the European strategy for AI. This document defines the main guidelines for its development. According to the document, it is necessary to develop skills necessary for work in the field of AI and to adapt the education systems of all European countries. It is estimated that by 2022, there will be 58 million new jobs in the area of artificial intelligence. It is very important for school students as the future generation who will develop and apply AI to begin to understand it from an early age, building also the necessary competence to support its growth.

The report of the CULT committee (Culture and Education Committee) to the European Parliament on the application of artificial intelligence in education (Tuomi, 2020) makes an in-depth analysis of the need to train specialists to develop and implement intelligent approaches in various areas of business and services.

According to these documents, given the rapid development of Artificial Intelligence and the accumulated backwardness of the formal education system from the needs of the labor market, it is necessary to increase the quality and efficiency of education, to update its content and to ensure a connection between the education system and the needs of business and society in the era of digital transformation. Based on these strategic documents, two main directions in the application of AI in school education have been identified:

- familiarization and deeper study of the main methods, aspects and algorithms of AI;
- use of intelligent educational environments and tools in school practice.

The first direction is related to the need to train specialists who in the future will create and manage processes and systems with AI. This determines the urgent need to experiment with different opportunities to study this discipline in different forms and degrees in school education (Gocen, 2021).

The second direction requires accelerating the process of developing modern intelligent educational tools, services and educational platforms to meet the ever-changing characteristics of the learning environment and meet the growing demands and expectations of the educational system (Celik, 2023).

Although the experience shows a high level of motivation and interest, the pedagogical community defines some essential problems that make the learning process difficult, (Humble et al., 2019) (Zhu et al., 2016), such as:

- problems with insufficient qualification of pedagogical specialists;
- the lack of established curricula suitable for different classes and forms of learning;
- lack of a pedagogical framework and guidelines for teaching AI in school

- insufficient basic knowledge of students, etc.

Since the problems and goals of education are common to all countries, a large part of these tasks in the European Union are solved through the development of common educational projects.

The main objectives of the FACILITATE-AI project are connected with supporting teachers (or/and facilitators of learning) in AI training in the schools. Our main tasks are to prepare school teachers to develop competences for becoming good facilitators of learning AI to their students, considering applications, strengths, and weaknesses, in line with Digital Competence Framework (DigComp 2.2) and Digital Education Framework (DigCompEdu).

Artificial Intelligence as a discipline and body of knowledge is quite dynamic, so the goal of the project is not simply to create a rigid curriculum and a rigid content text for it. We need to teach students how to adapt to dynamic changes and how to use critically and responsibly the opportunities that AI provides. Therefore, we want to create a dynamic artificial intelligence curriculum and information system to support teachers in the learning process. To achieve this goal, the project envisages three main deliverables: Result 1. AI Teaching Guide for Teachers Facilitating the Learning of Grades 7-12 Students, Result 2. Training Course for Teacher Facilitators of Learning in AI-STEAME+ education and Result 3. Dynamic online learning environment with OER of AI in interdisciplinary STEAME+ school subjects.

The target group in Result 2 are teachers and facilitators of learning from the European countries participating in the project proposal. Innovation and challenge is the development of an appropriate training course for learning to use teaching materials and learning resources for students from different countries and schools supporting the age groups (grades 7-12) as such a programme with special AI L&C Plans does not exist.

Teachers, for the most part, have not studied the full course of Artificial Intelligence in universities. The development of the training modules and the implementation and validation through piloting of the training course (through C2 activity) with teachers and facilitators will ensure security and sustainability in the training process.

RESULT 2 (R2) of the project: **"Training Course for Teacher Facilitators of learning in AI-STEAME+ education**" produced a training course for the target group teachers and facilitators to enable them to introduce AI to students of 7-12 grades. This course sets the framework that describes among others the competencies teachers need to acquire and develop in order to successfully facilitate AI learning. Furthermore, this document includes:

- Determination of PLF Competences for teacher facilitators transformed into Modules.
- Development and selection of additional modules and resources, focusing on the facilitation of the learning of AI by schools' students.
- Structuring of Training Programme 3 days with 3 modules per day.

Additionally, this Result provides resources and develops the content of a C2 Training Event, the purpose of which is to test the developed course so that more partner participants are trained with the results of the project, validating the modules through the practical implementation and creating videos for modules, to be used in Result 3.

To facilitate C2 learning, in the context of this outcome, the partners used the sample AI L&C plans developed and verified in Outcome 1, which relate to competencies for understanding AI concepts

and how they can be used in the learning process of 7- 12th grade in STEAME disciplines and other school subjects. The aim of the C2 training is to support teachers from the partner organizations to develop knowledge and skills in preparing AI L&C lesson plans in school.

One of the main innovations and challenges of the R2 result is the structuring of an appropriate training course for learning to use of teaching materials and learning resources for students from different countries and schools supporting the age groups (grades 7-12) as such a programme with special AI L&C Plans does not exist. This course has to acquire the necessary competencies to create and use an Artificial Intelligence Learning and Creativity Plan (L&C Plan) that can be used by teachers of different subjects in integrating topics related to artificial intelligence. The goal is to develop the necessary digital competencies of both teachers and students. To our knowledge, such AI L&C plans do not exist and are not used in school education.

The development of the training modules and the implementation and validation through piloting of the training course (through C2 STT activity) with teachers and facilitators will ensure security and sustainability in the training of future students. The harmonization of the training objectives and approaches in AI training in the participating European countries is one of the main tasks of the project proposal and this will facilitate the transferability within the full curricula subjects.

The expected impact is that now European Teachers and Facilitators of Learning will not only have a course that will tell them what is AI but a course that will train them how to use it and apply it in the teaching process so it is learned by school students and more over they will be able to be creative around it. Participants in the consortium of partners generated better expertise in the project's objectives by pooling knowledge and competencies related to both AI and pedagogical science.

Partners collaboratively worked on the following 3 main chapters, as activities and tasks of this Result:

1. COMPETENCE TRANSFORMED INTO MODULES (R2/A1)

The Modules will also cover elements from the C1 training mentioned above that will be made into recorded videos for understanding the AI basics and how these can relate to school education.

2. ADDITIONAL MODULES FOCUSING ON THE FACILITATION OF THE LEARNING OF AI BY SCHOOL STUDENTS (R2/A2)

9 Modules to facilitate student learning of AI, including digital learning material, PPP, video, etc. This task in includes building skills to develop L&C plans as well as using those created by the partners of this project in the implementation of R1. The 9 modules will be based on the need to develop the competences of future teachers as they are defined through R1/A1 – Pedagogical and learning framework.

3. TRAINING PROGRAMME 3 DAYS WITH 3 MODULES PER DAY (R2/A3)

Structuring of a 3-day training program with 3 modules per day plus hands-on, implementation, piloting, and validation, recorded into MOOC. This course is open to a limited number of external teacher participants from Associate partners or others, without any funding from the project. Having external teachers will increase the QA of the validity process and will help to receive wider feedback for improvement of the final Result 2, discussing elements relating to R3. The course is developed in the English language as the main terminology of AI exists mainly in English.

(GR) ΕΙΣΑΓΩΓΗ

Τα τελευταία χρόνια η Τεχνητή Νοημοσύνη (ΤΝ) εισέρχεται όλο και περισσότερο σε όλους τους τομείς της ζωής μας και, φυσικά, στην εκπαίδευση. Αναπτύσσονται προγράμματα σπουδών και διδακτικά βοηθήματα για διάφορα θέματα ΤΝ σε διάφορα μαθήματα, τάξεις και μορφές εκπαίδευσης- δημιουργούνται εργαλεία που, με τη βοήθεια της ΤΝ, είναι σε θέση να επηρεάσουν τη μάθηση και την επίτευξη των μαθησιακών στόχων. Για την υλοποίηση αυτών των εργασιών, έχουν δημιουργηθεί δέσμες στρατηγικών εγγράφων σε Παγκόσμιο, Ευρωπαϊκό και Εθνικό επίπεδο σχετικά με τη μελέτη της ΤΝ σε όλες τις βαθμίδες και μορφές εκπαίδευσης. Καθώς η ΤΝ αποτελεί σήμερα βασική προτεραιότητα για την Ευρωπαϊκή Επιτροπή και όπως αναφέρεται στη "Λευκή Βίβλο για την Τεχνητή Νοημοσύνη" (WPAI-EU, 2020), δεδομένου του παγκόσμιου ανταγωνισμού, απαιτείται μια σταθερή προσέγγιση της ΕΕ, η οποία θα βασίζεται στην Ευρωπαϊκή στρατηγική για την ΤΝ. Το παρόν έγγραφο καθορίζει τις κύριες κατευθυντήριες γραμμές για την ανάπτυξή της. Σύμφωνα με το έγγραφο, είναι απαραίτητο να αναπτυχθούν οι δεξιότητες που είναι απαραίτητες για την εργασία στον τομέα της ΤΝ και να προσαρμοστούν τα εκπαιδευτικά συστήματα όλων των Ευρωπαϊκών χωρών. Εκτιμάται ότι μέχρι το 2022 θα υπάρξουν 58 εκατομμύρια νέες θέσεις εργασίας στον τομέα της Τεχνητής Νοημοσύνης. Είναι πολύ σημαντικό για τους μαθητές των σχολείων, ως τη μελλοντική γενιά που θα αναπτύξει και θα εφαρμόσει την τεχνητή νοημοσύνη, να αρχίσουν να την κατανοούν από μικρή ηλικία, οικοδομώντας επίσης τις απαραίτητες ικανότητες για να υποστηρίξουν την ανάπτυξή της.

Η έκθεση της επιτροπής CULT (Επιτροπή Πολιτισμού και Παιδείας) προς το Ευρωπαϊκό Κοινοβούλιο σχετικά με την εφαρμογή της Τεχνητής Νοημοσύνης στην εκπαίδευση (Tuomi, 2020) αναλύει σε βάθος την ανάγκη κατάρτισης ειδικών για την ανάπτυξη και εφαρμογή ευφυών προσεγγίσεων σε διάφορους τομείς των επιχειρήσεων και των υπηρεσιών.

Σύμφωνα με τα έγγραφα αυτά, δεδομένης της ραγδαίας ανάπτυξης της Τεχνητής Νοημοσύνης και της συσσωρευμένης υστέρησης του επίσημου εκπαιδευτικού συστήματος σε σχέση με τις ανάγκες της αγοράς εργασίας, είναι απαραίτητο να αυξηθεί η ποιότητα και η αποτελεσματικότητα της εκπαίδευσης, να επικαιροποιηθεί το περιεχόμενό της και να εξασφαλιστεί η σύνδεση του εκπαιδευτικού συστήματος με τις ανάγκες των επιχειρήσεων και της κοινωνίας στην εποχή του ψηφιακού μετασχηματισμού. Με βάση αυτά τα στρατηγικά έγγραφα, έχουν προσδιοριστεί δύο κύριες κατευθύνσεις για την εφαρμογή της ΤΝ στη σχολική εκπαίδευση:

- εξοικείωση και βαθύτερη μελέτη των κύριων μεθόδων, πτυχών και αλγορίθμων της ΤΝ,
- χρήση ευφυών εκπαιδευτικών περιβαλλόντων και εργαλείων στη σχολική πρακτική.

Η πρώτη κατεύθυνση σχετίζεται με την ανάγκη εκπαίδευσης ειδικών που στο μέλλον θα δημιουργούν και θα διαχειρίζονται διαδικασίες και συστήματα με τεχνητή νοημοσύνη. Αυτό προσδιορίζει την επείγουσα ανάγκη να πειραματιστεί με διαφορετικές ευκαιρίες για τη μελέτη αυτού του κλάδου σε διαφορετικές μορφές και βαθμούς στη σχολική εκπαίδευση (Gocen, 2021).

Η δεύτερη κατεύθυνση απαιτεί την επιτάχυνση της διαδικασίας ανάπτυξης σύγχρονων ευφυών εκπαιδευτικών εργαλείων, υπηρεσιών και εκπαιδευτικών πλατφορμών, ώστε να ανταποκρίνονται στα συνεχώς μεταβαλλόμενα χαρακτηριστικά του μαθησιακού περιβάλλοντος και να ικανοποιούν τις αυξανόμενες απαιτήσεις και προσδοκίες του εκπαιδευτικού συστήματος (Celik, 2023).

Παρόλο που η εμπειρία δείχνει ένα υψηλό επίπεδο κινήτρων και ενδιαφέροντος, η παιδαγωγική κοινότητα ορίζει ορισμένα βασικά προβλήματα που δυσχεραίνουν τη μαθησιακή διαδικασία, (Humble et al., 2019) (Zhu et al., 2016), όπως:

- προβλήματα με την ανεπαρκή εξειδίκευση των παιδαγωγικών ειδικών,
- η έλλειψη καθιερωμένων προγραμμάτων σπουδών κατάλληλων για διάφορες τάξεις και μορφές μάθησης,
- έλλειψη παιδαγωγικού πλαισίου και κατευθυντήριων γραμμών για τη διδασκαλία της ΤΝ στο σχολείο
- ανεπαρκείς βασικές γνώσεις των μαθητών κ.λπ.

Δεδομένου ότι τα προβλήματα και οι στόχοι της εκπαίδευσης είναι κοινά για όλες τις χώρες, ένα μεγάλο μέρος αυτών των καθηκόντων στην Ευρωπαϊκή Ένωση επιλύεται μέσω της ανάπτυξης κοινών εκπαιδευτικών σχεδίων.

Οι κύριοι στόχοι του έργου FACILITATE-AI συνδέονται με την υποστήριξη των εκπαιδευτικών (ή / και των «διευκολυντών» της μάθησης) στην εκπαίδευση στην ΤΝ στα σχολεία. Τα κύρια καθήκοντά μας είναι να προετοιμάσουμε τους εκπαιδευτικούς των σχολείων ώστε να αναπτύξουν ικανότητες για να διευκολύνουν καλύτερα τη μάθηση της ΤΝ στους μαθητές τους, λαμβάνοντας υπόψη τις εφαρμογές, τα δυνατά σημεία και τις αδυναμίες, σύμφωνα με το Πλαίσιο Ψηφιακών Ικανοτήτων (DigComp 2.2) και το Πλαίσιο Ψηφιακής Εκπαίδευσης (DigCompEdu).

Η Τεχνητή Νοημοσύνη ως επιστημονικός κλάδος και σύνολο γνώσεων είναι αρκετά δυναμική, οπότε ο στόχος του έργου δεν είναι απλώς η δημιουργία ενός άκαμπτου προγράμματος σπουδών και ενός άκαμπτου κειμένου περιεχομένου γι' αυτό. Πρέπει να διδάξουμε στους μαθητές πώς να προσαρμόζονται στις δυναμικές αλλαγές και πώς να χρησιμοποιούν με κριτικό και υπεύθυνο τρόπο τις ευκαιρίες που παρέχει η Τεχνητή Νοημοσύνη. Ως εκ τούτου, θέλουμε να δημιουργήσουμε ένα δυναμικό πρόγραμμα σπουδών τεχνητής νοημοσύνης και ένα πληροφοριακό σύστημα για την υποστήριξη των εκπαιδευτικών στη μαθησιακή διαδικασία. Για την επίτευξη αυτού του στόχου, το έργο προβλέπει τρία κύρια αποτελέσματα: Αποτέλεσμα 1. Οδηγός διδασκαλίας της Τεχνητής Νοημοσύνης για εκπαιδευτικούς που διευκολύνει τη μάθηση των μαθητών των τάξεων 7-12, Αποτέλεσμα 2. Σεμινάριο κατάρτισης για εκπαιδευτικούς που διευκολύνουν τη μάθηση στην εκπαίδευση με AI-STEAME+ και Αποτέλεσμα 3. Δυναμικό διαδικτυακό περιβάλλον μάθησης με Ανοικτές Εκπαιδευτικές Πηγές (ΑΕΠ) της ΤΝ σε διαθεματικά σχολικά μαθήματα STEAME+.

Η ομάδα-στόχος του αποτελέσματος 2 είναι οι εκπαιδευτικοί και οι «διευκολυντές» της μάθησης από τις Ευρωπαϊκές χώρες που συμμετέχουν στην πρόταση του έργου. Καινοτομία και πρόκληση είναι η ανάπτυξη ενός κατάλληλου προγράμματος κατάρτισης για την εκμάθηση της χρήσης διδακτικού υλικού και μαθησιακών πηγών για μαθητές από διαφορετικές χώρες και σχολεία που υποστηρίζουν τις ηλικιακές ομάδες (τάξεις 7-12), καθώς δεν υπάρχει τέτοιο πρόγραμμα με ειδικά σχέδια Μάθησης και Δημιουργικότητας (Μ&Δ) πάνω στην ΤΝ.

Οι εκπαιδευτικοί, ως επί το πλείστον, δεν έχουν μελετήσει την πλήρη πορεία της Τεχνητής Νοημοσύνης στα πανεπιστήμια. Η ανάπτυξη των εκπαιδευτικών ενοτήτων και η εφαρμογή και επικύρωση μέσω της πιλοτικής εφαρμογής του εκπαιδευτικού μαθήματος (μέσω της δραστηριότητας Γ2) με εκπαιδευτικούς και διαμεσολαβητές θα διασφαλίσει την ασφάλεια και τη βιωσιμότητα της εκπαιδευτικής διαδικασίας.

ΑΠΟΤΕΛΕΣΜΑ 2 (R2) του έργου: **"Εκπαιδευτικό σεμινάριο για εκπαιδευτικούς που διευκολύνουν τη μάθηση στην εκπαίδευση AI-ΣΤΕΑΜΕ+"** παρήγαγε ένα εκπαιδευτικό σεμινάριο για τους εκπαιδευτικούς και τους «διευκολυντές» της ομάδας-στόχου, ώστε να μπορέσουν να εισάγουν την ΤΝ στους μαθητές των τάξεων 7-12. Το μάθημα αυτό θέτει το πλαίσιο που περιγράφει μεταξύ άλλων τις ικανότητες που πρέπει να αποκτήσουν και να αναπτύξουν οι εκπαιδευτικοί προκειμένου να διευκολύνουν επιτυχώς τη μάθηση της ΤΝ. Επιπλέον, το παρόν έγγραφο περιλαμβάνει:

- Καθορισμός των ικανοτήτων του Πλαισίου Παιδαγωγικής Μάθησης για τους εκπαιδευτικούς που διευκολύνουν τους εκπαιδευτικούς και μετατρέπονται σε Ενότητες.
- Ανάπτυξη και επιλογή πρόσθετων ενοτήτων και πηγών, με επίκεντρο τη διευκόλυνση της εκμάθησης της ΤΝ από τους μαθητές των σχολείων.
- Διάρθρωση του προγράμματος κατάρτισης 3 ημέρες με 3 ενότητες ανά ημέρα.

Επιπλέον, αυτό το Αποτέλεσμα παρέχει πόρους και αναπτύσσει το περιεχόμενο μιας Εκπαιδευτικής Εκδήλωσης Γ2, σκοπός της οποίας είναι να δοκιμαστεί το μάθημα που αναπτύχθηκε, ώστε περισσότεροι συμμετέχοντες εταίροι να εκπαιδευτούν με τα αποτελέσματα του έργου, επικυρώνοντας τις ενότητες μέσω της πρακτικής εφαρμογής και δημιουργώντας βίντεο για τις ενότητες, που θα χρησιμοποιηθούν στο Αποτέλεσμα 3.

Για τη διευκόλυνση της μάθησης Γ2, στο πλαίσιο αυτού του αποτελέσματος, οι εταίροι χρησιμοποίησαν τα υποδειγματικά σχέδια Μ&Δ ΤΝ που αναπτύχθηκαν και επαληθεύτηκαν στο αποτέλεσμα 1, τα οποία σχετίζονται με τις ικανότητες για την κατανόηση των εννοιών ΤΝ και τον τρόπο με τον οποίο μπορούν να χρησιμοποιηθούν στη μαθησιακή διαδικασία της 7ης έως 12ης τάξης στα γνωστικά αντικείμενα STEAME και σε άλλα σχολικά μαθήματα. Στόχος της κατάρτισης Γ2 είναι να υποστηρίξει τους εκπαιδευτικούς από τους οργανισμούς-εταίρους να αναπτύξουν γνώσεις και δεξιότητες για την προετοιμασία σχεδίων μαθημάτων Μ&Δ ΤΝ στο σχολείο.

Μια από τις κύριες καινοτομίες και προκλήσεις του αποτελέσματος2 είναι η διάρθρωση ενός κατάλληλου εκπαιδευτικού προγράμματος για την εκμάθηση της χρήσης διδακτικού υλικού και μαθησιακών πόρων για μαθητές από διαφορετικές χώρες και σχολεία που υποστηρίζουν τις ηλικιακές ομάδες (τάξεις 7-12), καθώς δεν υπάρχει τέτοιο πρόγραμμα με ειδικά σχέδια Μ&Δ ΤΝ. Αυτό το μάθημα πρέπει να αποκτήσει τις απαραίτητες ικανότητες για τη δημιουργία και χρήση ενός σχεδίου μάθησης και δημιουργικότητας Τεχνητής Νοημοσύνης (Σχέδιο Μ&Δ) που μπορεί να χρησιμοποιηθεί από τους εκπαιδευτικούς διαφορετικών μαθημάτων για την ενσωμάτωση θεμάτων που σχετίζονται με την Τεχνητή Νοημοσύνη. Στόχος είναι να αναπτυχθούν οι απαραίτητες ψηφιακές ικανότητες τόσο των εκπαιδευτικών όσο και των μαθητών. Εξ όσων γνωρίζουμε, τέτοια σχέδια Μ&Δ τεχνητής νοημοσύνης δεν υπάρχουν και δεν χρησιμοποιούνται στη σχολική εκπαίδευση.

Η ανάπτυξη των εκπαιδευτικών ενοτήτων και η εφαρμογή και επικύρωση μέσω της πιλοτικής εφαρμογής του εκπαιδευτικού προγράμματος (μέσω της δραστηριότητας C2 Εκπαίδευσης Μικρής Διάρκειας) με εκπαιδευτικούς και διαμεσολαβητές θα διασφαλίσει την ασφάλεια και τη βιωσιμότητα της κατάρτισης των μελλοντικών σπουδαστών. Η εναρμόνιση των εκπαιδευτικών στόχων και των προσεγγίσεων στην εκπαίδευση στην ΤΝ στις συμμετέχουσες Ευρωπαϊκές χώρες είναι ένα από τα κύρια καθήκοντα της πρότασης του έργου και αυτό θα διευκολύνει τη δυνατότητα μεταφοράς στο πλαίσιο όλων των θεμάτων του προγράμματος σπουδών.

Ο αναμενόμενος αντίκτυπος είναι ότι τώρα οι Ευρωπαίοι εκπαιδευτικοί και οι «διευκολυντές» της μάθησης δεν θα έχουν μόνο ένα μάθημα που θα τους λέει τι είναι η Τεχνητή Νοημοσύνη, αλλά ένα μάθημα που θα τους εκπαιδεύει πώς να τη χρησιμοποιούν και να την εφαρμόζουν στη διδακτική διαδικασία, ώστε να τη μαθαίνουν οι μαθητές και επιπλέον να μπορούν να είναι δημιουργικοί γύρω από αυτήν. Οι συμμετέχοντες στην κοινοπραξία των εταίρων δημιούργησαν καλύτερη τεχνογνωσία στους στόχους του έργου με τη συγκέντρωση γνώσεων και ικανοτήτων που σχετίζονται τόσο με την ΤΝ όσο και με την παιδαγωγική επιστήμη.

Οι εταίροι εργάστηκαν συνεργατικά στα ακόλουθα 3 κύρια κεφάλαια, ως δραστηριότητες και καθήκοντα του παρόντος Αποτελέσματος:

1. ΙΚΑΝΌΤΗΤΑ ΜΕΤΑΣΧΗΜΑΤΙΣΜΈΝΗ ΣΕ ΕΝΌΤΗΤΕΣ (R2/A1)

Οι Ενότητες θα καλύπτουν επίσης στοιχεία από την προαναφερθείσα εκπαίδευση C1, τα οποία θα μετατραπούν σε μαγνητοσκοπημένα βίντεο για την κατανόηση των βασικών αρχών της ΤΝ και τον τρόπο με τον οποίο αυτές μπορούν να συνδεθούν με τη σχολική εκπαίδευση.

2. ΠΡΌΣΘΕΤΕΣ ΕΝΌΤΗΤΕΣ ΠΟΥ ΕΣΤΙΆΖΟΥΝ ΣΤΗ ΔΙΕΥΚΌΛΥΝΣΗ ΤΗΣ ΕΚΜΆΘΗΣΗΣ ΤΗΣ ΤΕΧΝΗΤΉΣ ΝΟΗΜΟΣΎΝΗΣ ΑΠΌ ΤΟΥΣ ΜΑΘΗΤΈΣ (R2/A2)

Εννέα ενότητες για τη διευκόλυνση της εκμάθησης της ΤΝ από τους μαθητές, συμπεριλαμβανομένου ψηφιακού εκπαιδευτικού υλικού, PPT, βίντεο κ.λπ. Το έργο αυτό περιλαμβάνει την ανάπτυξη δεξιοτήτων για την ανάπτυξη σχεδίων Μ&Δ, καθώς και τη χρήση αυτών που δημιουργήθηκαν από τους εταίρους αυτού του έργου κατά την εφαρμογή του Αποτελέσματος 1(R1). Οι 9 ενότητες θα βασίζονται στην ανάγκη ανάπτυξης των ικανοτήτων των μελλοντικών εκπαιδευτικών, όπως αυτές ορίζονται μέσω του R1/A1 - Παιδαγωγικό και μαθησιακό πλαίσιο.

3. ΠΡΌΓΡΑΜΜΑ ΚΑΤΆΡΤΙΣΗΣ 3 ΗΜΕΡΏΝ ΜΕ 3 ΕΝΌΤΗΤΕΣ ΑΝΆ ΗΜΈΡΑ (R2/A3)

Διάρθρωση ενός τριήμερου εκπαιδευτικού προγράμματος με 3 ενότητες ανά ημέρα και πρακτική εξάσκηση, εφαρμογή, πιλοτική εφαρμογή και επικύρωση, που θα καταγραφεί σε Ανοιχτά Διαδικτυακά Μαθήματα (MOOC). Αυτό το μάθημα είναι ανοικτό σε περιορισμένο αριθμό εξωτερικών συμμετεχόντων εκπαιδευτικών από συνεργαζόμενους εταίρους ή άλλους, χωρίς καμία χρηματοδότηση από το έργο. Η συμμετοχή εξωτερικών εκπαιδευτικών θα αυξήσει τη διασφάλιση της ποιότητας της διαδικασίας εγκυρότητας και θα βοηθήσει στη λήψη ευρύτερης ανατροφοδότησης για τη βελτίωση του τελικού αποτελέσματος 2, συζητώντας στοιχεία που σχετίζονται με το αποτέλεσμα 3 (R3). Το μάθημα αναπτύσσεται στην αγγλική γλώσσα, καθώς η κύρια ορολογία της ΤΝ υπάρχει κυρίως στα αγγλικά.

(IT) INTRODUZIONE

Negli ultimi anni l'intelligenza artificiale (AI) sta entrando sempre più in tutte le sfere della nostra vita e, ovviamente, nell'istruzione. Curriculum e sussidi didattici sono sviluppati su vari argomenti di intelligenza artificiale in diverse materie, classi e forme di istruzione; vengono creati strumenti che, con l'aiuto dell'AI, sono in grado di influenzare l'apprendimento e il raggiungimento degli obiettivi di apprendimento. Per la realizzazione di questi compiti, sono stati creati pacchetti di documenti strategici a livello mondiale, europeo e nazionale riguardanti lo studio dell'IA in tutti i gradi e forme di istruzione. Poiché l'intelligenza artificiale è attualmente una priorità chiave per la CE e, come indicato nel "Libro bianco sull'intelligenza artificiale" (WPAI-EU, 2020), data la concorrenza globale, è necessario un solido approccio dell'UE, che si baserà sulla strategia europea per l'intelligenza artificiale. Il presente documento definisce le principali linee guida per il suo sviluppo. Secondo il documento è necessario sviluppare le competenze necessarie per lavorare nel campo dell'intelligenza artificiale e adattare i sistemi educativi di tutti i paesi europei. Si stima che entro il 2022 ci saranno 58 milioni di nuovi posti di lavoro nel settore dell'intelligenza artificiale. È molto importante che gli studenti delle scuole, in quanto generazione futura che svilupperà e applicherà l'intelligenza artificiale, inizino a comprenderla fin dalla tenera età, costruendo anche le competenze necessarie per sostenerne la crescita.

Il rapporto della commissione CULT (Commissione Cultura e Istruzione) al Parlamento Europeo sull'applicazione dell'intelligenza artificiale nell'istruzione (Tuomi, 2020) analizza approfonditamente la necessità di formare specialisti per sviluppare e implementare approcci intelligenti in diversi ambiti delle imprese e dei servizi.

Secondo questi documenti, dato il rapido sviluppo dell'intelligenza artificiale e l'arretratezza accumulata del sistema educativo formale rispetto alle esigenze del mercato del lavoro, è necessario aumentare la qualità e l'efficienza dell'istruzione, aggiornarne i contenuti e garantire un collegamento tra il sistema educativo e le esigenze delle imprese e della società nell'era della trasformazione digitale. Sulla base di questi documenti strategici sono state individuate due direzioni principali nell'applicazione dell'IA nell'istruzione scolastica:

- familiarizzazione e approfondimento dei principali metodi, aspetti e algoritmi dell'IA;
- utilizzo di ambienti e strumenti educativi intelligenti nella pratica scolastica.

La prima direzione è legata alla necessità di formare specialisti che in futuro creeranno e gestiranno processi e sistemi con l'intelligenza artificiale. Ciò determina l'urgente necessità di sperimentare diverse opportunità di studio di questa disciplina in diverse forme e gradi nell'istruzione scolastica (Gocen, 2021).

La seconda direzione richiede di accelerare il processo di sviluppo di strumenti, servizi e piattaforme educative intelligenti e moderni per soddisfare le caratteristiche in continua evoluzione dell'ambiente di apprendimento e soddisfare le crescenti richieste e aspettative del sistema educativo (Celik, 2023).

Sebbene l'esperienza mostri un alto livello di motivazione e interesse, la comunità pedagogica definisce alcuni problemi essenziali che rendono difficile il processo di apprendimento, (Humble et al., 2019) (Zhu et al., 2016), come:

- problemi dell'insufficiente qualifica degli specialisti pedagogici;

- la mancanza di programmi di studio consolidati adatti alle diverse classi e forme di apprendimento;
- mancanza di un quadro pedagogico e di linee guida per l'insegnamento dell'IA a scuola
- conoscenza di base insufficiente degli studenti, ecc.

Poiché i problemi e gli obiettivi dell'istruzione sono comuni a tutti i paesi, gran parte di questi compiti nell'Unione Europea vengono risolti attraverso lo sviluppo di progetti educativi comuni.

Gli obiettivi principali del progetto FACILITATE-AI sono legati al supporto degli insegnanti (o/e facilitatori dell'apprendimento) nella formazione sull'IA nelle scuole. I nostri compiti principali sono preparare gli insegnanti della scuola a sviluppare competenze per diventare buoni facilitatori dell'apprendimento dell'intelligenza artificiale per i loro studenti, considerando applicazioni, punti di forza e di debolezza, in linea con il Quadro delle competenze digitali (DigComp 2.2) e il Quadro dell'educazione digitale (DigCompEdu).

L'intelligenza artificiale come disciplina e insieme di conoscenze è molto dinamica, quindi l'obiettivo del progetto non è semplicemente quello di creare un curriculum rigido e un testo dai contenuti rigidi. Dobbiamo insegnare agli studenti come adattarsi ai cambiamenti dinamici e come utilizzare in modo critico e responsabile le opportunità offerte dall'intelligenza artificiale. Pertanto, vogliamo creare un curriculum dinamico di intelligenza artificiale e un sistema informativo per supportare gli insegnanti nel processo di apprendimento. Per raggiungere questo obiettivo, il progetto prevede tre risultati principali: Risultato 1. Guida didattica sull'intelligenza artificiale per insegnanti che facilitano l'apprendimento degli studenti delle classi 7-12, Risultato 2. Corso di formazione per insegnanti facilitatori dell'apprendimento nell'istruzione AI-STEAME+ e Risultato 3. Ambiente di apprendimento dinamico online con OER dell'intelligenza artificiale in materie scolastiche interdisciplinari STEAME+.

Il gruppo target del Risultato 2 sono insegnanti e facilitatori dell'apprendimento dei paesi europei che partecipano alla proposta di progetto. L'innovazione e la sfida sono lo sviluppo di un corso di formazione appropriato per imparare a utilizzare materiali didattici e risorse di apprendimento per studenti provenienti da diversi paesi e scuole che supportano le fasce di età (classi 7-12), poiché non esiste un programma di questo tipo con speciali piani L&C AI.

La maggior parte degli insegnanti non ha studiato l'intero corso di Intelligenza Artificiale nelle università. Lo sviluppo dei moduli di formazione, l'implementazione e la validazione attraverso la sperimentazione del corso di formazione (attraverso l'attività C2) con insegnanti e facilitatori garantiranno sicurezza e sostenibilità nel processo di formazione.

Il RISULTATO 2 (R2) del progetto: "**Corso di formazione per docenti facilitatori dell'apprendimento nell'istruzione AI-STEAME+**" ha prodotto un corso di formazione per insegnanti e facilitatori del gruppo target per consentire loro di introdurre l'IA agli studenti delle classi 7-12. Questo corso definisce il quadro che descrive, tra le altre, le competenze che gli insegnanti devono acquisire e sviluppare per facilitare con successo l'apprendimento dell'intelligenza artificiale. Inoltre, questo documento include:

- Determinazione delle Competenze PLF per i facilitatori degli insegnanti trasformate in Moduli.

- Sviluppo e selezione di moduli e risorse aggiuntivi, concentrandosi sulla facilitazione dell'apprendimento dell'intelligenza artificiale da parte degli studenti delle scuole.
- Strutturazione del programma di formazione 3 giorni con 3 moduli al giorno.

Inoltre, questo risultato fornisce risorse e sviluppa il contenuto di un evento di formazione C2, il cui scopo è testare il corso sviluppato in modo che più partecipanti partner vengano formati con i risultati del progetto, convalidando i moduli attraverso l'implementazione pratica e creando video per i moduli, da utilizzare nel Risultato 3.

Per facilitare l'apprendimento C2, nel contesto di questo risultato, i partner hanno utilizzato i piani campione di L&C dell'IA sviluppati e verificati nel Risultato 1, che si riferiscono alle competenze per comprendere i concetti di intelligenza artificiale e come possono essere utilizzati nel processo di apprendimento del 7-12° anno. nelle discipline STEAME e in altre materie scolastiche. Lo scopo della formazione C2 è supportare gli insegnanti delle organizzazioni partner nello sviluppo di conoscenze e competenze nella preparazione dei piani di lezione di L&C sull'intelligenza artificiale a scuola.

Una delle principali innovazioni e sfide del risultato R2 è la strutturazione di un corso di formazione appropriato per imparare a utilizzare materiali didattici e risorse di apprendimento per studenti provenienti da diversi paesi e scuole che supportano le fasce di età (classi 7-12) siccome tale programma con piani speciali L&C AI non esiste. Questo corso deve acquisire le competenze necessarie per creare e utilizzare un piano di apprendimento e creatività dell'intelligenza artificiale (piano L&C) che può essere utilizzato da insegnanti di diverse materie nell'integrazione di argomenti relativi all'intelligenza artificiale. L'obiettivo è sviluppare le competenze digitali necessarie sia degli insegnanti che degli studenti. A nostra conoscenza, tali piani di L&C sull'IA non esistono e non vengono utilizzati nell'istruzione scolastica.

Lo sviluppo dei moduli formativi e l'implementazione e validazione attraverso la sperimentazione del corso di formazione (attraverso l'attività C2 STT) con insegnanti e facilitatori garantiranno sicurezza e sostenibilità nella formazione dei futuri studenti. L'armonizzazione degli obiettivi formativi e degli approcci alla formazione sull'IA nei paesi europei partecipanti è uno dei compiti principali della proposta di progetto e ciò faciliterà la trasferibilità all'interno delle materie curriculari complete.

L'impatto atteso è che ora gli insegnanti e i facilitatori dell'apprendimento europei non avranno solo un corso che spiegherà loro cos'è l'intelligenza artificiale, ma un corso che li formerà su come usarla e applicarla nel processo di insegnamento in modo che venga appresa dagli studenti delle scuole e oltretutto potranno essere creativi al riguardo. I partecipanti al consorzio di partner hanno generato una migliore esperienza negli obiettivi del progetto mettendo in comune conoscenze e competenze relative sia all'intelligenza artificiale che alla scienza pedagogica.

I partner hanno lavorato in collaborazione sui seguenti 3 capitoli principali, come attività e compiti di questo risultato:

1. COMPETENZE TRASFORMATE IN MODULI (R2/A1)

I moduli copriranno anche elementi della formazione C1 menzionata sopra che verranno trasformati in video registrati per comprendere le basi dell'intelligenza artificiale e come queste possano essere correlate all'istruzione scolastica.

2. **MODULI AGGIUNTIVI INCENTRATI SULLA FACILITAZIONE DELL'APPRENDIMENTO DELL'AI DA PARTE DEGLI STUDENTI DELLA SCUOLA (R2/A2)**

9 moduli per facilitare l'apprendimento dell'intelligenza artificiale da parte degli studenti, inclusi materiale didattico digitale, PPP, video, ecc. Questo compito include lo sviluppo di competenze per sviluppare piani L&C nonché l'utilizzo di quelli creati dai partner di questo progetto nell'implementazione di R1. I 9 moduli si baseranno sulla necessità di sviluppare le competenze dei futuri insegnanti come definite attraverso R1/A1 – Quadro pedagogico e di apprendimento.

3. **PROGRAMMA DI FORMAZIONE 3 GIORNI CON 3 MODULI AL GIORNO (R2/A3)**

Strutturazione di un programma di formazione di 3 giorni con 3 moduli al giorno più attività pratiche, implementazione, pilotaggio e convalida, registrati nel MOOC. Questo corso è aperto a un numero limitato di partecipanti docenti esterni provenienti da partner associati o altri, senza alcun finanziamento da parte del progetto. Avere docenti esterni aumenterà la QA del processo di validità e aiuterà a ricevere un feedback più ampio per il miglioramento del Risultato finale 2, discutendo elementi relativi a R3. Il corso è sviluppato in lingua inglese poiché la terminologia principale dell'IA esiste principalmente in inglese.

(PT) INTRODUÇÃO

Nos últimos anos, a Inteligência Artificial (IA) tem vindo a entrar cada vez mais em todas as esferas das nossas vidas e, claro, na educação. Currículos e materiais de ensino estão a ser desenvolvidos em vários tópicos de IA em diferentes tópicos, disciplinas e formas de educação; estão a ser criadas ferramentas que, com o auxílio da IA, conseguem influenciar a aprendizagem e alcançar objetivos de aprendizagem. Para concretizar estas tarefas, foram criados referenciais e documentos estratégicos a nível mundial, europeu e nacional relativos ao estudo da IA em todos os níveis e formas de educação. Visto que a IA é atualmente uma prioridade chave para a Comissão Europeia e, como indicado no "Livro Branco sobre Inteligência Artificial" (WPAI-UE, 2020), dada a competição global, é necessária uma abordagem sólida da UE, que se baseará na estratégia europeia para a IA. Este documento define as principais diretrizes para o seu desenvolvimento. De acordo com o documento, é necessário desenvolver competências necessárias para trabalhar no campo da IA e adaptar os sistemas de educação de todos os países europeus. Estima-se que até 2022 haverá 58 milhões de novos empregos na área da inteligência artificial. É muito importante para os estudantes, pois são a geração futura que irá desenvolver e aplicar a IA, começar a compreendê-la desde tenra idade, construindo também a competência necessária para apoiar o seu crescimento.

O relatório da comissão CULT (Culture and Education Committee) ao Parlamento Europeu sobre a aplicação da inteligência artificial na educação (Tuomi, 2020) faz uma análise profunda da necessidade de formar especialistas para desenvolver e implementar abordagens inteligentes em várias áreas de negócios e serviços.

De acordo com estes documentos, tendo em conta o rápido desenvolvimento da Inteligência Artificial e o atraso acumulado do sistema de ensino formal em relação às necessidades do mercado de trabalho, é necessário aumentar a qualidade e eficiência da educação, atualizar o seu conteúdo e assegurar uma

ligação entre o sistema de educação e as necessidades das empresas e da sociedade na era da transformação digital. Com base nestes documentos estratégicos, foram identificadas duas direções principais na aplicação da IA na educação escolar:

- Familiarização e aprofundamento nos principais métodos, aspetos e algoritmos da IA;
- Utilização de ambientes e ferramentas educacionais inteligentes na prática escolar.

A primeira direção está relacionada com a necessidade de formar especialistas que no futuro irão criar e gerir processos e sistemas com IA. Isso determina a necessidade urgente de experimentar diferentes oportunidades para estudar esta disciplina em diferentes formas e níveis de educação escolar (Gocen, 2021).

A segunda direção requer acelerar o processo de desenvolvimento de ferramentas educacionais inteligentes modernas, serviços e plataformas educacionais para responder às características em constante mudança do ambiente de aprendizagem e satisfazer as crescentes exigências e expectativas do sistema educacional (Celik, 2023).

Embora a experiência mostre um alto nível de motivação e interesse, a comunidade pedagógica identifica alguns problemas essenciais que dificultam o processo de aprendizagem (Humble et al., 2019) (Zhu et al., 2016), tais como:

- Problemas com a qualificação insuficiente dos especialistas pedagógicos;
- A falta de currículos estabelecidos adequados para diferentes classes e formas de ensino;
- A ausência de um quadro pedagógico e diretrizes para o ensino de IA na escola;
- Conhecimentos básicos insuficientes dos alunos, entre outros.

Uma vez que os problemas e objetivos da educação são comuns a todos os países, uma grande parte dessas tarefas na União Europeia é resolvida através do desenvolvimento de projetos educacionais comuns.

Os principais objetivos do projeto FACILITATE-AI estão relacionados com o apoio aos professores (ou facilitadores de aprendizagem) na formação de IA nas escolas. As nossas principais tarefas consistem em preparar os professores para desenvolver competências que os tornem bons facilitadores da aprendizagem de IA aos seus alunos, tendo em consideração aplicações, pontos fortes e fracos, em conformidade com o Quadro de Competências Digitais (DigComp 2.2) e o Quadro de Educação Digital (DigCompEdu).

A Inteligência Artificial como disciplina de conhecimento é bastante dinâmica, por isso, o objetivo do projeto não é simplesmente criar um currículo rígido e conteúdo textural rígido para a mesma. Precisamos ensinar aos alunos como se adaptar às mudanças dinâmicas e como usar de forma crítica e responsável as oportunidades que a IA oferece. Portanto, pretendemos criar um currículo dinâmico de Inteligência Artificial e um sistema de informação para apoiar os professores no processo de ensino. Para atingir este objetivo, o projeto prevê três principais resultados: Resultado 1. Guia de Ensino de IA para Professores Facilitadores da Aprendizagem de Alunos dos 7º ao 12º Ano, Resultado 2. Curso de Formação para Facilitadores de Aprendizagem em Educação de IA-STEAME+ e Resultado 3. Ambiente de Aprendizagem Online Dinâmico com REA de IA em disciplinas escolares interdisciplinares STEAME+.

O grupo-alvo no Resultado 2 são professores e facilitadores de aprendizagem dos países europeus que participam na proposta do projeto. A inovação e o desafio consistem no desenvolvimento de um curso de formação adequado para aprender a usar materiais de ensino e recursos de aprendizagem para alunos de diferentes países e escolas que apoiam os grupos etários (7º ao 12º ano), uma vez que um programa com planos de aprendizagem e competências específicas em IA não existe.

A maioria dos professores não estudou um curso completo de Inteligência Artificial na universidade. O desenvolvimento dos módulos de formação e a implementação e validação através da realização de testes do curso de formação (através da atividade C2) com professores e facilitadores garantirá segurança e sustentabilidade no processo de formação.

RESULTADO 2 (R2) do projeto: **"Curso de Formação para Facilitadores de Aprendizagem em Educação de IA-STEAME+"** produziu um curso de formação para o grupo-alvo de professores e facilitadores, permitindo-lhes abordar a IA aos alunos dos 7º ao 12º ano. Este curso estabelece o enquadramento que descreve, entre outros, as competências que os professores precisam adquirir e desenvolver para facilitar com sucesso a aprendizagem de IA. Além disso, este documento inclui:

- Determinação das competências do PLF (Professor Facilitador de Aprendizagem) transformadas em Módulos.
- Desenvolvimento e seleção de módulos e recursos adicionais, com foco na facilitação da aprendizagem de IA pelos alunos das escolas.
- Estruturação do Programa de Formação de 3 dias com 3 módulos por dia.

Além disso, este Resultado disponibiliza recursos e desenvolve o conteúdo de um Evento de Formação C2, cujo propósito é testar o curso desenvolvido, de forma a que mais parceiros participantes sejam formados com os resultados do projeto, validando os módulos através da implementação prática com recurso avídeos para os módulos, a serem utilizados no Resultado 3.

Para facilitar a aprendizagem C2, no contexto deste resultado, os parceiros utilizaram os planos de aprendizagem e competências de IA apresentados, desenvolvidos e verificados no Resultado 1, que se relacionam com competências para compreender os conceitos de IA e como podem ser usados no processo de aprendizagem dos alunos dos 7º ao 12º ano em disciplinas STEAME. O objetivo da formação C2 é apoiar os professores das organizações parceiras a desenvolver conhecimentos e competências na preparação de planos de aulas de IA L&C na escola.

Uma das principais inovações e desafios do Resultado 2 é a estruturação de um curso de formação adequado para aprender a utilizar materiais de ensino e recursos de aprendizagem para estudantes de diferentes países e escolas que apoiam grupos etários (7º ao 12º ano), uma vez que um programa com planos de IA L&C especiais não existe. Com este curso deve ser possível adquirir as competências necessárias para criar e usar um Plano de Aprendizagem e Criatividade em Inteligência Artificial (Plano L&C) que pode ser utilizado por professores de diferentes disciplinas na integração de tópicos relacionados com a inteligência artificial. O objetivo é desenvolver as competências digitais necessárias tanto dos professores como dos alunos. Até onde sabemos, tais planos de IA L&C não existem e não são utilizados no ensino escolar.

O desenvolvimento dos módulos de formação e a implementação e validação através da realização de testes do curso de formação (através da atividade C2 STT) com professores e facilitadores

garantem segurança e sustentabilidade na formação dos futuros alunos. A harmonização dos objetivos de formação e abordagens na formação de IA nos países europeus participantes é uma das principais tarefas da proposta do projeto e isso irá facilitar a transferibilidade dentro dos currículos completos.

O impacto esperado é que agora os professores e facilitadores de aprendizagem europeus não têm apenas um curso que lhes irá dizer o que é a IA, mas um curso que os irá formar a usá-la e a aplicá-la no processo de ensino, para que seja aprendida pelos alunos e, além disso, que permita serem capazes de ser criativos em torno dela. Os participantes no consórcio de parceiros adquiriram maior especialização nos objetivos do projeto, ao reunir conhecimentos e competências relacionadas tanto com a IA como com a ciência pedagógica.

Os parceiros colaboraram de forma colaborativa nos seguintes 3 principais capítulos, como atividades e tarefas deste Resultado:

1. COMPETÊNCIA TRANSFORMADA EM MÓDULOS (R2/A1)

Os módulos também abrangem elementos do treino C1 mencionado acima, que são transformados em vídeos gravados para compreender os conceitos básicos de IA e como estes podem estar relacionados com a educação escolar.

2. MÓDULOS ADICIONAIS COM ENFOQUE NA FACILITAÇÃO DA APRENDIZAGEM DE IA PELOS ALUNOS DA ESCOLA (R2/A2)

9 módulos para facilitar a aprendizagem de IA pelos alunos, incluindo material de aprendizagem digital, PPP, vídeo, etc. Esta tarefa inclui o desenvolvimento de capacidades para desenvolver planos L&C, bem como o uso dos planos criados pelos parceiros deste projeto na implementação do R1. Os 9 módulos são baseados na necessidade de desenvolver as competências dos futuros professores, conforme definido através do R1/A1 - Quadro Pedagógico e de Aprendizagem.

3. PROGRAMA DE FORMAÇÃO DE 3 DIAS COM 3 MÓDULOS POR DIA (R2/A3)

Estruturação de um programa de formação de 3 dias com 3 módulos por dia, além de atividades práticas, implementação, teste e validação, gravados em MOOC. Este curso está aberto a um número limitado de participantes externos, professores de parceiros associados ou outros, sem financiamento do projeto. A inclusão de professores externos irá permitir aumentar a garantia da qualidade do processo de validação e ajudar a obter um feedback mais amplo para melhorar o Resultado 2, discutindo elementos relacionados com o R3. O curso é desenvolvido em língua inglesa, uma vez que a terminologia principal da IA existe principalmente em inglês.

(RO) INTRODUCERE

În ultimii ani, inteligența artificială (AI) pătrunde din ce în ce mai mult în toate sferele vieții noastre și, desigur, în educație. Curriculumul și materialele didactice sunt dezvoltate pe diverse teme IA în diferite discipline, clase și forme de educație; sunt create instrumente care, cu ajutorul AI, sunt capabile să influențeze învățarea și realizarea obiectivelor de învățare. Pentru realizarea acestor sarcini, au fost create pachete de documente strategice la nivel mondial, european și național privind studiul IA în toate gradele și formele de învățământ. Întrucât IA este în prezent o prioritate-cheie pentru CE și astfel cum se indică în "Cartea albă privind inteligența artificială" (WPAI-UE, 2020),

având în vedere concurența mondială, este necesară o abordare solidă a UE, care se va baza pe strategia europeană pentru IA. Acest document definește principalele orientări pentru dezvoltarea sa. Potrivit documentului, este necesar să se dezvolte abilitățile necesare pentru a lucra în domeniul AI și să se adapteze sistemele educaționale din toate țările europene. Se estimează că, până în 2022, vor exista 58 de milioane de noi locuri de muncă în domeniul inteligenței artificiale. Este foarte important ca elevii, ca generație viitoare care va dezvolta și aplica IA, să înceapă să o înțeleagă de la o vârstă fragedă, construind, de asemenea, competența necesară pentru a o implementa din ce în ce mai bine.

Raportul Comisiei CULT (Comisia pentru cultură și educație) către Parlamentul European privind aplicarea inteligenței artificiale în educație (Tuomi, 2020) face o analiză aprofundată a necesității formării specialiștilor pentru a dezvolta și implementa abordări inteligente în diverse domenii de afaceri și servicii.

Conform acestor documente, având în vedere dezvoltarea rapidă a Inteligenței Artificiale și lacunele acumulate de sistemului formal de educație față de nevoile pieței muncii, este necesară creșterea calității și eficienței educației, actualizarea conținutului acesteia și asigurarea unei conexiuni între sistemul educațional și nevoile mediului de afaceri și societății în era transformării digitale. Pe baza acestor documente strategice, au fost identificate două direcții principale în aplicarea IA în învățământul preuniversitar:

● familiarizarea și studiul aprofundat al principalelor metode, aspecte și algoritmi ai IA;

● utilizarea mediilor și instrumentelor educaționale inteligente în practica școlară.

Prima direcție este legată de necesitatea instruirii specialiștilor care în viitor vor crea și gestiona procese și sisteme cu AI. Acest lucru determină nevoia urgentă de a experimenta diferite oportunități de a studia această disciplină în diferite forme și grade în învățământul școlar (Gocen, 2021).

A doua direcție necesită accelerarea procesului de dezvoltare a instrumentelor, serviciilor și platformelor educaționale inteligente moderne pentru a răspunde caracteristicilor în continuă schimbare ale mediului de învățare și pentru a răspunde cerințelor și așteptărilor tot mai mari ale sistemului educațional (Celik, 2023).

Deși experiența arată un nivel ridicat de motivație și interes, comunitatea pedagogică definește câteva probleme esențiale care îngreunează procesul de învățare (Humble et al., 2019) (Zhu et al., 2016), cum ar fi:

● probleme cu calificarea insuficientă a specialiștilor pedagogici;

● lipsa unor programe de învățământ adecvate, adecvate diferitelor clase și forme de învățare;

● lipsa unui cadru pedagogic și a unor orientări pentru predarea IA în școală

● cunoștințe de bază insuficiente ale studenților etc.

Deoarece problemele și obiectivele educației sunt comune tuturor țărilor, o mare parte din aceste sarcini în Uniunea Europeană sunt rezolvate prin dezvoltarea de proiecte educaționale comune.

Principalele obiective ale proiectului FACILITATE-AI sunt legate de sprijinirea profesorilor (sau / și facilitatorilor învățării) în formarea AI în școli. Principalele noastre sarcini sunt de a pregăti profesorii să dezvolte competențe pentru a deveni buni coordonatori ai învățării AI pentru elevii lor,

luând în considerare aplicațiile, punctele forte și punctele slabe, în conformitate cu Cadrul competențelor digitale (DigComp 2.2) și Cadrul educației digitale (DigCompEdu).

Inteligența artificială ca disciplină și corp de cunoștințe este destul de dinamică, astfel încât scopul proiectului nu este pur și simplu de a crea un curriculum rigid și un text de conținut rigid pentru acesta. Trebuie să-i învățăm pe elevi cum să se adapteze la schimbările dinamice și cum să utilizeze în mod critic și responsabil oportunitățile pe care le oferă IA. Prin urmare, dorim să creăm un curriculum dinamic de inteligență artificială și un sistem informatic care să sprijine profesorii în procesul de învățare. Pentru a atinge acest obiectiv, proiectul are în vedere trei rezultate principale: Rezultatul 1. Ghid de predare AI pentru profesori care coordonează învățarea elevilor din clasele 7-12; Rezultatul 2. Curs de formare pentru coordonatorii profesorilor din cadrul programelor de educație AI-STEAME+ și Rezultatul 3. Mediu dinamic de învățare IA online cu OER pentru disciplinele școlare interdisciplinare STEAME+.

Grupul țintă din Rezultatul 2 sunt profesorii și coordonatorii învățării din țările europene participante la propunerea de proiect. Inovația și provocarea reprezintă dezvoltarea unui curs de formare adecvat pentru a învăța să utilizeze materiale didactice și resurse de învățare pentru elevii din diferite țări și școli care sprijină grupele de vârstă (clasele 7-12), deoarece nu există un astfel de program cu planuri speciale de IA L&C.

Profesorii, în cea mai mare parte, nu au studiat cursul complet de inteligență artificială în universități. Dezvoltarea modulelor de formare și implementarea și validarea prin pilotare a cursului de formare (prin activitatea C2) cu profesori și facilitatori vor asigura securitatea și sustenabilitatea procesului de formare.

REZULTATUL 2 (R2) al proiectului: "Curs de formare pentru profesorilor din cadrul programlor de educație AI-STEAME+" a produs un curs de formare pentru profesorii și coordonatorii grupului țintă pentru a le permite să prezinte cunoștințe de bază IA elevilor din clasele 7-12. Acest curs stabilește cadrul care descrie, printre altele, competențele pe care profesorii trebuie să le dobândească și să le dezvolte pentru a facilita cu succes învățarea AI. În plus, acest document include:

● Determinarea competențelor PLF pentru coordonatorii profesorilor transformate în module.

● Dezvoltarea și selectarea de module și resurse suplimentare, cu accent pe facilitarea învățării IA de către elevii școlilor.

● Structurarea programului de formare 3 zile cu 3 module pe zi.

În plus, acest rezultat oferă resurse și dezvoltă conținutul unui eveniment de formare C2, al cărui scop este de a testa cursul dezvoltat, astfel încât mai mulți participanți parteneri să fie instruiți cu rezultatele proiectului, validarea modulelor prin implementarea practică și crearea de videoclipuri pentru module, care să fie utilizate în Rezultatul 3.

Pentru a facilita învățarea C2, în contextul acestui rezultat, partenerii au folosit exemplul de planuri IA L&C dezvoltate și verificate în Rezultatul 1, care se referă la competențele pentru înțelegerea conceptelor AI și modul în care acestea pot fi utilizate în procesul de învățare din clasele 7-12 în disciplinele STEAME și alte discipline școlare. Scopul instruirii C2 este de a sprijini profesorii din organizațiile partenere să dezvolte cunoștințe și abilități în pregătirea planurilor de lecție IA L&C în școală.

Una dintre principalele inovații și provocări ale rezultatului R2 este structurarea unui curs de formare adecvat pentru prezentarea modalităților de utilizare a materialelor didactice și a resurselor de învățare pentru elevii din diferite țări și școli care sprijină grupele de vârstă (clasele 7-12), deoarece nu există un astfel de program cu planuri speciale IA L &C. Acest curs trebuie să dobândească competențele necesare pentru a crea și utiliza un Plan de învățare și creativitate a inteligenței artificiale (Plan L&C) care poate fi utilizat de profesori de diferite discipline în integrarea subiectelor legate de inteligența artificială. Scopul este de a dezvolta competențele digitale necesare atât ale profesorilor, cât și ale elevilor. Din cunoștințele noastre, astfel de planuri IA L&C nu există și nu sunt utilizate în educația școlară.

Dezvoltarea modulelor de formare și implementarea și validarea prin pilotare a cursului de formare (prin activitatea C2 STT) cu profesori și coordonatori vor asigura securitatea și sustenabilitatea în formarea viitorilor studenți. Armonizarea obiectivelor și abordărilor de formare în formarea IA în țările europene participante este una dintre sarcinile principale ale propunerii de proiect și acest lucru va facilita transferabilitatea în cadrul disciplinelor curriculare complete.

Impactul preconizat este că, acum, profesorii și coordonatorii europeni ai învățării nu vor avea doar un curs care le va spune ce este IA, ci și un curs care îi va instrui cum să o folosească și să o aplice în procesul de predare, astfel încât să fie asimilată de elevi și, mai mult, vor putea fi creativi în acestă privință. Participanții la consorțiul de parteneri au generat o mai bună expertiză în obiectivele proiectului prin punerea în comun a cunoștințelor și competențelor legate atât de IA, cât și de știința pedagogică.

Partenerii au lucrat în colaborare la următoarele 3 capitole principale, ca activități și sarcini ale acestui rezultat:

1. COMPETENȚE TRANSFORMATE ÎN MODULE (R2/A1)

Modulele vor acoperi, de asemenea, elemente din formarea C1 menționată mai sus, care vor fi transformate în videoclipuri înregistrate pentru înțelegerea elementelor de bază ale IA și a modului în care acestea se pot referi la educația școlară.

2. MODULE SUPLIMENTARE AXATE PE FACILITAREA ÎNVĂȚĂRII IA DE CĂTRE ELEVI (R2/A2)

Au fost concepute 9 module pentru a facilita asimilarea cunoștințelor IA de către elevi, inclusiv materiale digitale de învățare, PPP, video etc. Această sarcină include construirea abilităților de dezvoltare a planurilor L&C, precum și utilizarea celor create de partenerii acestui proiect în implementarea R1. Cele 9 module se vor baza pe necesitatea dezvoltării competențelor viitorilor profesori așa cum sunt definite prin R1/A1 – Cadrul pedagogic și de învățare.

3. PROGRAM DE FORMARE 3 ZILE CU 3 MODULE PE ZI (R2/A3)

Structurarea unui program de formare de 3 zile cu 3 module pe zi, implementare, pilotare și validare, înregistrate în MOOC. Acest curs este deschis unui număr limitat de profesori participanți externi din partea partenerilor asociați sau a altor persoane, fără nicio finanțare din proiect. Având profesori externi va crește QA a procesului de validitate și va ajuta la primirea unui feedback mai larg pentru îmbunătățirea rezultatului final 2, discutând elemente legate de R3. Cursul este dezvoltat în limba engleză, deoarece terminologia principală a IA există în principal în limba engleză.

(BG) ВЪВЕДЕНИЕ

През последните години изкуственият интелект (ИИ) все повече навлиза във всички сфери на нашия живот и, разбира се, в образованието. Разработват се учебни програми и учебни помагала по разнообразни теми по различни предмети, класове и форми на обучение; създават се инструменти, които с негова помощ са в състояние да повлияят на ученето и постигането на целите на обучението. За реализацията на тези задачи са създадени пакети от стратегически документи на световно, европейско и национално ниво, касаещи изучаването му във всички степени и форми на обучение. Тъй като ИИ понастоящем е ключов приоритет за ЕК и както е посочено в "Бялата книга за изкуствения интелект" (WPAI-EU, 2020) предвид глобалната конкуренция, е необходим солиден подход на ЕС, който ще се основава на европейската стратегия за Изкуствен интелект.

Този документ определя главните насоки за развитието на изкуствения интелект в обучението. Според документа е задължително развитието на необходимите умения за работа в сферата на ИИ и да се адаптират всички образователни системи в страните от ЕС. Изчислено беше, че до 2022 би трябвало да има 58 милиона нови работни места в сферата на ИИ. Много е важно за учениците като бъдещо поколение, което ще развива и прилага в действие изкуствения интелект, да го усвои от ранна възраст, както и да гради компетентности, за да допринесе за неговия ръст.

Докладът на КУЛТ (Културен и образователен комитет) към Европейския парламент относно приложението на ИИ в образованието (Туоми, 2020) прави задълбочен анализ на нуждата от обучение на специалисти, които да развиват и налагат интелигентни подходи в различни области на бизнеса и услугите.

Според тези документи, имайки предвид бързото развитие на ИИ, и акумулираната изостаналост на формалната система на образованието от нуждите на пазара на труда, е необходимо да повишим качеството и ефективността му, да обновим съдържанието и да осигурим свързаност между образователната система и нуждите на бизнеса и обществото в ерата на цифровата трансформация.

Имайки предвид тези стратегически документи, две главни посоки в прилагането на ИИ в училищното образование са идентифицирани:

- Запознаване и по-задълбочено изучаване на основните методи, аспекти и алгоритми на изкуствения интелект;
- Използване на интелигентни образователни среди и инструменти в училищната дейност.

Първото направление се свързва с нуждата от обучение на специалисти, които в бъдеще ще създават и управляват процеси и системи с ИИ. Това определя спешната необходимост да се експериментира с различни възможности за изучаване на тази дисциплина в различни форми и степени в училищното образование (Госен, 2021).

Второто направление изисква ускоряване на процеса на развитие на съвременни интелигентни образователни инструменти, услуги и образователни платформи да достигнат вечно-променящите се характеристики на обучителната среда и да посрещнат растящите изисквания и очаквания на образователната система (Селик, 2023).

Въпреки, че опитът показва високо ниво на мотивация и интерес, педагогическата общност дефинира някои значими проблеми, които правят процеса на обучение труден (Хъмбъл и др., 2019) (Жу и др., 2016), като:

- проблеми с липса на квалификация на специалистите;
- липса на установен учебен план подходящ за различни класове и форми на обучение;
- липса на педагогическа рамка и насоки за преподаване на ИИ в училище;
- недостатъчни основни познания на учениците и др.

Понеже проблемите и целите на образованието са общи за всички страни, голяма част от тези проблеми в ЕС се решават чрез развитието на общи образователни проекти.

Основните цели на проекта FACILITATE-AI са свързани с подкрепата на учители (и/или модератори на обучението) в обучението на ИИ в училищата. Нашите основни задачи са да подготвим учителите да усъвършенстват компетентностите си да бъдат добри модератори на обучението за ИИ на техните ученици, имайки в предвид приложението, слабостите и силните страни, съобразно Рамката за цифрови компетентности (DigComp 2.2) и Цифровата рамка за образование (DigCompEdu).

Изкуственият интелект като дисциплина и съвкупност от знания е доста динамичен и затова целта на проекта е не само да създаде компактен учебен план и съдържание за него. Трябва да научим учениците да се адаптират към динамичните промени и как да използват отговорно и обмислено средствата, които предоставя изкуствения интелект. Затова ние искаме да създадем динамичен учебен план за изкуствен интелект и информационна система за подпомагане на учителите в учебния процес. За да постегнем тази цел, проектът предвижда три основни резултата: Резултат 1. Ръководство за учителите на ученици от 7-12 клас, Резултат 2. Курс за обучение на учители по AI-STEAME+ образование и Резултат 3. Динамична онлайн среда за обучение с отворени ресурси за ИИ в междупредметната STEAME+ област.

Целевата група в Резултат 2 са учители и модератори в обучението от европейските страни, участващи в проекта. Иновация и предизвикателство е разработването на подходящ обучителен курс за обучение за използване на учебни материали и учебни ресурси за ученици от различни страни и училища, подкрепящи възрастовите групи (7-12 клас), тъй като такава програма със специални планове за ИИ за учене и креативност, наречени Learning & Creativity plans, които не съществуват.

Учителите в по-голямата си част не са изучавали пълния курс по изкуствен интелект в университетите. Разработването на обучителните модули и внедряването и валидирането чрез пилотиране на обучителния курс (чрез дейност C2) с учители и модератори ще гарантира сигурност и устойчивост в обучителния процес.

РЕЗУЛТАТ 2 (P2) на проекта **“** Обучителен курс за учители модератори на обучението в AI-STEAME+ образование ” развива обучителен курс за целевата група учители и модератори, за да им даде възможност да представят ИИ на ученици от 7-12 клас. Този курс определя рамката, която описва, наред с другото, компетентностите, които учителите трябва да придобият и развият, за да улеснят успешно обучението по ИИ. Освен това този документ включва:

- Определяне на PLF компетентности за фасилитатори на учители, трансформирани в модули.

- Разработване и подбор на допълнителни модули и ресурси, с акцент върху улесняването на изучаването на ИИ от учениците в училищата.
- Структуриране на обучителната програма 3 дни с 3 модула на ден.

Освен това, този резултат предоставя ресурси и развива съдържанието на C2 обучително събитие, чиято цел е да тества разработения курс, така че повече участници партньори да бъдат обучени с резултатите от проекта, валидиране на модулите чрез практическото изпълнение и създаване на видеоклипове за модули, които да се използват в Резултат 3.

За да улеснят обучението по C2, в контекста на този резултат, партньорите използваха примерните AI L&C планове, разработени и проверени в Резултат 1, които се отнасят до компетентностите за разбиране на концепциите на ИИ и как те могат да бъдат използвани в учебния процес на 7-12 клас в дисциплините STEAME и други учебни предмети. Целта на обучението C2 е да подпомогне учителите от партньорските организации да развият знания и умения при изготвянето на планове за уроци по AI L&C в училище.

Едно от основните нововъведения и предизвикателства на резултата от P2 е структурирането на подходящ обучителен курс за обучение за използване на учебни материали и учебни ресурси за ученици от различни страни и училища, подкрепящи възрастовите групи (7-12 клас), тъй като такава програма със специални планове за AI L &C не съществува. Този курс трябва да придобие необходимите компетентности за създаване и използване на план за обучение и творчество в областта на изкуствения интелект (L&C Plan), който може да се използва от учители по различни предмети при интегрирането на теми, свързани с изкуствения интелект. Целта е да се развият необходимите дигитални компетентности както на учителите, така и на учениците. Доколкото ни е известно, такива AI L&C планове не съществуват и не се използват в училищното образование.

Разработването на обучителните модули и внедряването и валидирането чрез пилотиране на обучителния курс (чрез C2 STT дейност) с учители и фасилитатори ще гарантира сигурност и устойчивост в обучението на бъдещите ученици. Хармонизирането на целите и подходите на обучение в обучението по ИИ в участващите европейски страни е една от основните задачи на проектното предложение и това ще улесни преносимостта в рамките на пълните учебни предмети.

Очакваното въздействие е, че сега европейските учители и фасилитатори на ученето не само ще имат курс, който ще им каже какво е ИИ, но и курс, който ще ги обучи как да го използват и прилагат в учебния процес, така че да се учи от учениците и повече ще могат да бъдат креативни около него. Участниците в консорциума от партньори генерираха по-добра експертиза в целите на проекта чрез обединяване на знания и компетентности, свързани както с ИИ, така и с педагогическата наука. Партньорите съвместно работиха по следните 3 основни глави, като дейности и задачи на този Резултат:

1. КОМПЕТЕНТНОСТ, ТРАНСФОРМИРАНА В МОДУЛИ (R2/A1)

Модулите обхващат и елементи от обучението по C1, споменати по-горе, които ще бъдат направени в записани видеоклипове за разбиране на основите на ИИ и как те могат да се отнасят до училищното образование.

2. ДОПЪЛНИТЕЛНИ МОДУЛИ, НАСОЧЕНИ КЪМ УЛЕСНЯВАНЕ НА ИЗУЧАВАНЕТО НА ИЗКУСТВЕН ИНТЕЛЕКТ ОТ УЧЕНИЦИ (P2/A2)

9 Модули за улесняване на обучението на студентите по ИИ, включително дигитален учебен материал, PPP, видео и др. Тази задача включва изграждане на умения за разработване на L&C планове, както и използване на тези, създадени от партньорите по този проект при изпълнението на P1. 9-те модула ще се основават на необходимостта от развитие на компетентностите на бъдещите учители, както са дефинирани чрез P1/A1 – Педагогическа и учебна рамка.

3. ПРОГРАМА ЗА ОБУЧЕНИЕ 3 ДНИ С 3 МОДУЛА НА ДЕН (P2/A3)

Структуриране на 3-дневна програма за обучение с 3 модула на ден плюс практически, внедряване, пилотиране и валидиране, записани в MOOC. Този курс е отворен за ограничен брой външни участници учители от асоциирани партньори или други, без никакво финансиране от проекта. Наличието на външни учители ще повиши качеството на процеса на валидиране и ще помогне да се получи по-широка обратна връзка за подобряване на крайния резултат 2, като се обсъждат елементи, свързани с P3. Курсът е разработен на английски език, като основната терминология на ИИ съществува главно на английски език.

1. COMPETENCIES TRANSFORMED INTO MODULES (R2/A1)

This task builds on the outcomes of R1/A1, focusing here on how these digital competencies will be translated into teacher training modules. In working on Result R1, we established the following frameworks for AI digital competencies for teachers and students.

AI - Competences Framework for teachers and facilitators

European Digital Competence Framework for Citizens - ***DigComp*** offers a tool to improve citizens' digital competences (Vuorikari, 2016). The latest version ***DigComp 2.2*****.** from the summer of 2022 includes as an annex, the digital competences related to Artificial Intelligence, the Internet of Things, the development and use of cyber-physical systems (Vuorikari et al., 2022). The competences areas (CA) of the DigComp are the following competence areas:

- CA 1: Information and data literacy
- CA 2: Communication and collaboration
- CA 3: Digital content creation
- CA 4: Safety
- CA 5: Problem solving

For each of these CA areas, digital competencies are defined at several levels – fundamental, intermediate, advanced, and highly specialized. In school education, the goal is to reach the first two

levels. Some of the built-in DigComp 2.2. competences related to the use of Artificial Intelligence and the study of individual aspects of it are aimed at the basic areas of competence CA as follows:

- CA 2: AI 01. Identifying areas where AI can bring benefits in different aspects of everyday life.
- CA 2: AI 08. Some artificial intelligence systems aim to provide human interaction with machines (eg personal assistants, customer service chatbots, etc.).
- CA 2: AI 09. Knowledge of AI systems that can detect users' moods, feelings and emotions automatically from observation, online communication, information and context.
- CA 3: AI 04. Knowledge that AI systems collect and process multiple types of user data and create user profiles to be used to support students and teachers.
- CA 3: AI 07. Knowledge of AI systems that can help the user edit and process digital content (eg programming, photo editing, text content, audio information, etc.).
- CA 5: AI 10. Knowledge that some AI systems are designed to support the teaching and learning of humans (e.g. when performing tasks in the learning process).

The European Framework for the Digital Competence of Educators - ***DigCompEdu*** is a framework for educators to be digitally competent. It provides a general reference frame to support the development of educator-specific digital competences in Europe. DigCompEdu describes 22 competencies organized into six areas (Fig.1):

- Area 1: Professional Engagement
- Area 2: Digital Resources
- Area 3: Teaching and Learning
- Area 4: Assessment
- Area 5: Empowering Learners
- Area 6: Facilitating Learners' Digital Competence

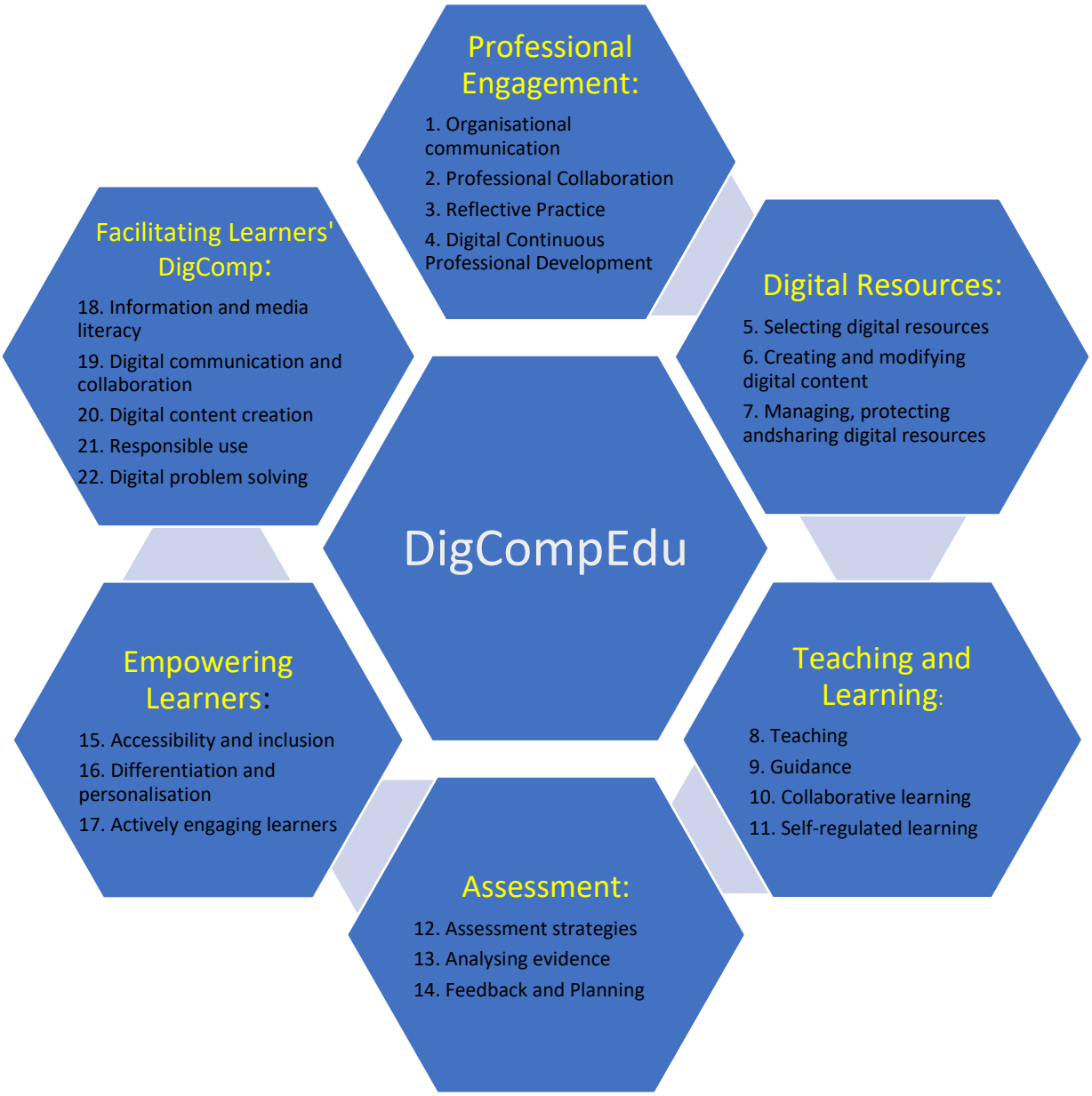

Figure 1. DidCompEdu competences

The focus of this framework is not on technical skills, but rather aims to specify how digital technologies can be used to improve and innovate in education and training (Bećirović, 2023). It is important for teachers to be able to understand to what extent they possess the necessary competencies. An online tool (https://digital-competence.eu/) has been developed through which, in the form of a survey, every teacher can receive information about the level of their skills in the context of DigCompEdu. The result of an example assessment of a specific teacher can be seen in Figure 2.

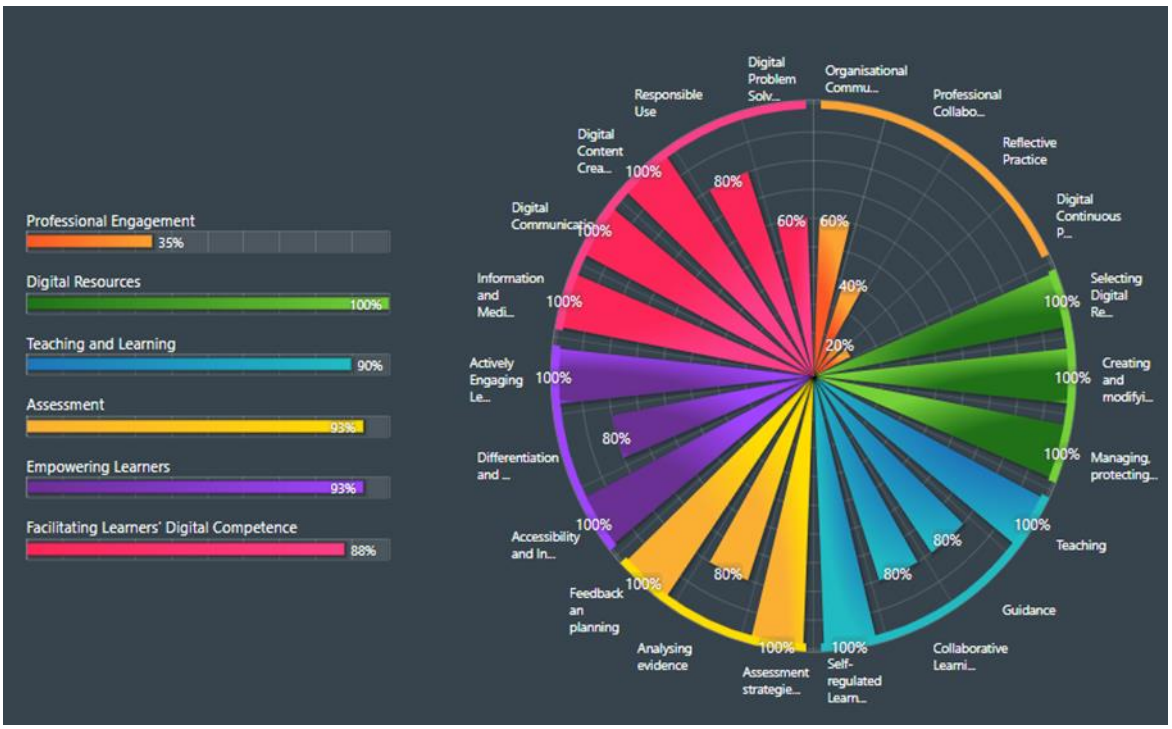

Figure 2. Sample DigCompEdu Teacher Self-Evaluation

Based on these frameworks, in the project we defined a specific framework of competences for teachers, including five areas (Table 1).

Table 1. Framework of teacher's competences in the project

Teaching & Learning		Information & Digital Literacy	Communication & Collaboration	Creation & Innovation	Emotion & Ethics
Teaching	Learning				
Acquiring specific transferable achievements	Self-regulated learning	Applying algorithms	Actively engaging learners	Actively enabling learners	Awareness of digital division and exclusion
Adapting accessibility and inclusion	Enhancing the activities for learning	Critical navigation	Collaborating through digital technologies	Adapting technology to create knowledge	Awareness of guidelines for ethical systems
Adapting differen-tiation and personalisation	Actively engaging learners	Exploring information and digital content	Communicating computational thinking	Creating content responsively	Protecting privacy
Adopting new methods of teaching and learning	Implemen-ting learning plans	Evaluating information and digital content	Communicating technology responsively	Creatively using digital technology	Respecting safety and well-being
Creatively using digital technology		Developing digital content	Identifying digital gaps	Identifying digital gaps	

Interacting through digital technologies		Interacting through digital technologies	Interacting through digital technologies	Knowledge existing innovation ecosystems	
Enhancing the effectiveness of teaching		Managing data and digital content	Sharing through digital technologies	Knowledge of the strategic innovation	
Ensure continuous professional development		Processing data and digital content		Proposing creative solutions to problems	
Identifying needs and technological responses				Using processes for implementing innovation management	
Eliminating disadvantages				Representation and reasoning	
Using assessment strategies				Solving technical problems	
Providing feedback to learners					

AI - Competences Framework for students

The competences and the skills in the student's framework are almost the same as in the teacher's framework with the exclusion of the ones that are referring to teaching and managing skills. Based on the created Framework for teachers' AI competences, we also developed a Framework for students' AI digital competences with five areas (Table 2).

Table 2. Framework of student's competences in the project

Learning (Strategies, Empowering Learners, Assessment)	**Information & Digital Literacy** (Digital Sources, Digital Creation, Coding)	**Communication & Collaboration** (Motivation, Teamwork, Sharing, Promoting)	**Creation & Innovation** (Problem Solving, Creative Thinking, Reasoning)	**Emotion & Ethics** (Attitudes-Values, Social Emotional Skills, Privacy)
Self-regulated learning	Applying algorithms	Actively engaging learners	Adapting technology to create knowledge	Protecting privacy
Enhancing the activities for learning	Critical navigation	Collaborating through digital technologies	Creating content responsively	Respecting safety and well-being
Actively engaging in learning	Developing digital content	Communicating computational thinking	Creatively using digital technology	Awareness of machine ethics

Implementing learning plans	Evaluating information and digital content	Communicating technology responsively	Proposing creative solutions to problems	
Creatively using & interacting with digital technology	Exploring information and digital content	Identifying digital gaps	Representation and reasoning	
Acquiring specific achievements	Interacting through digital technologies	Interacting through digital technologies		
	Managing data and digital content	Sharing through digital technologies		
	Processing data and digital content			

Digital Competences transformed into Modules

We defined the AI curriculum in 8 core training modules, which they tested and refined during the C1 training:

- M1: AI STEAME models of Learning
- M2: AI in our life
- M3: Basics of AI
- M4: Teaching through games competitions – cooperation
- M5: Digital Skills & Data Literacy
- M6: Building an AI model
- M7: Innovation - Creativity - Entrepreneurship
- M8: Ethics about AI

The determination of the modules with learning content and the digital competencies that will be realized through them is realized through a continuous process of discussions on working groups and consultations with external experts. The following table shows the relationship between the topics of these modules and the target digital competencies (Table 3).

Table 3. Relationship between the modules and target digital competencies

Digital Competences	C1 Modules
Teaching & Learning	
Self-regulated learning	M1, M7
Enhancing the activities for learning	M1, M4, M6
Actively engaging in learning	M1, M4, M7
Implementing learning plans	M5, M6
Creatively using & interacting with digital technology	M2, M7
Eliminating disadvantages	M6
Acquiring specific achievements	M4, M6

Using assessment strategies	M1, M7
Adapting accessibility and inclusion	M1
Adapting differentiation and personalisation	M1
Acquiring specific transferable achievement	M4
Adopting new methods of teaching and learning	M4, M6
Enhancing the effectiveness of teaching	M4, M1, M6
Ensure continuous professional development	M5
Identifying needs and technological responses	M7
Interacting through digital technologies	M1
Providing feedback to learners	M1
Information and Digital Literacy	
Applying algorithms	M3,M4
Critical navigation	M5
Developing digital content	M5, M3, M4
Evaluating information and digital content	M3, M4
Exploring information and digital content	M2, M4, M7
Interacting through digital technologies	M2, M5, M6
Managing data and digital content	M3, M6
Processing data and digital content	M5
Communication & Collaboration	
Actively engaging learners	M4
Collaborating through digital technologies	M1, M4
Communicating computational thinking	M2, M7
Communicating technology responsively	M2, M7
Identifying digital gaps	M6, M7
Interacting through digital technologies	M4, M2, M5
Sharing through digital technologies	M2, M7, M4
Creation & Innovation	
Adapting technology to create knowledge	M3, M7
Actively enabling learners	M7
Creating content responsively	M6, M8, M7
Creatively using digital technology	M3, M6, M7
Proposing creative solutions to problems	M3, M4, M7
Representation and reasoning	M3, M6, M2
Knowledge existing innovation ecosystems	M7
Using processes for implementing innovation management	M7
Emotion & Ethics	
Protecting privacy	M8, M2
Respecting safety and well-being	M8,M2

Awareness of machine ethics	M8
Awareness of digital division and exclusion	M8

The distribution of competences from different areas in the learning content of the training modules shows a good level of coverage, and the wider scope of some modules confirms the higher level of interdisciplinarity and comprehensiveness. Figure 3 visualizes the relationship between the competence areas and the C1 learning modules that most closely implement them.

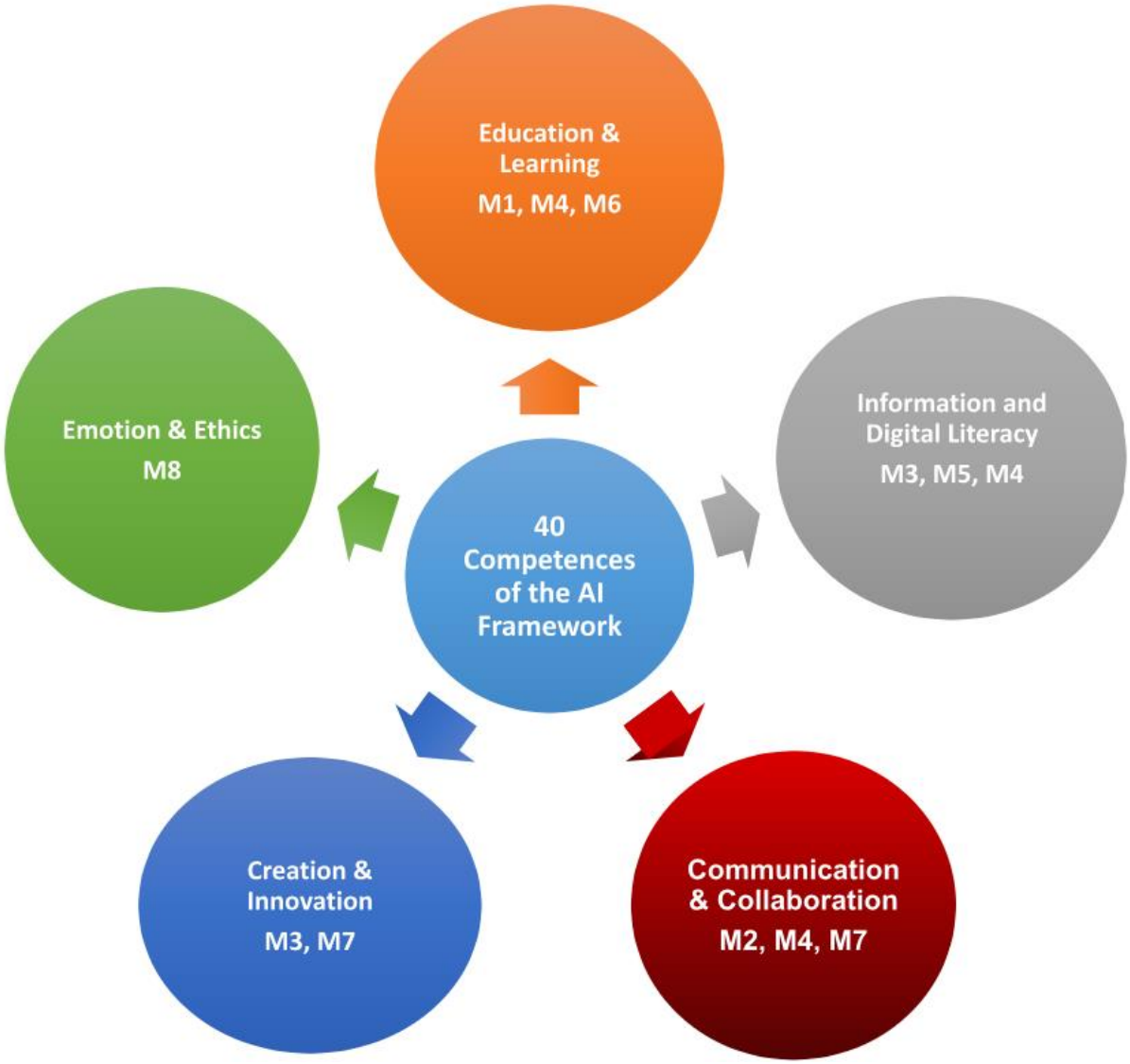

Figure 3. Modules and Competences of AI Framework

Appendix 1, created and verified by the partners and experts, can be used to determine the level at which the development of students' key digital competences is aimed at during training on individual topics and modules.

2. ADDITIONAL MODULES FOCUSING ON THE FACILITATION OF THE LEARNING OF AI BY SCHOOL STUDENTS (R2/A2)

The R2/A2 task is related to supporting the students' learning in the individual modules. After the C1 training and the discussions held, it was decided to develop video files with the presentation of the learning content for the individual modules. All partners have recorded and shared these video files that can be used by students and teachers when teaching the topics.

Additional resources into modules

All resources were published on the project site: https://facilitate-ai.eu/. The resources developed on the topics are presented into Table 4:

Table 4. Additional resources into modules

Modules	Topics	Link	Responsible partner
Module 1	AI STEAME models for learning	https://www.youtube.com/watch?v=dDxoVzq7_1g	ITCS PACLE Morante, Italy
Module 2	AI in our life	https://www.youtube.com/watch?v=1YOJeLHl2AU	Ivan Apostolov School, BG
Module 3	Knowledge Representation	https://www.youtube.com/watch?v=jSfYpOFcBZc	Plovdiv University, BG
	Logic programming in Prolog		Plovdiv University, BG
	Main search AI algorithms		Plovdiv University, BG
	Programming in Python		Plovdiv University, BG
Module 4	Teaching through games competitions- Part1	https://youtu.be/Lkl4npDeSkE	Instituto Politecnico do Porto, PT
	Teaching through games competitions- Part 2		Instituto Politecnico do Porto, PT
	Teaching through games competitions- Part 3		Instituto Politecnico do Porto, PT
Module 5	Digital Skills & Data Literacy	https://www.youtube.com/watch?v=HydUxACtbNA	Doukas School, GR

Module 6	Building an AI model	https://www.youtube.com/watch?v=2M8VP6P-fWU	IASA, GR
Module 7	Innovation Creativity Entrepreneurship	https://www.youtube.com/watch?v=2M8VP6P-fWU	University, RO
Module 8	Ethics about AI	https://www.youtube.com/watch?v=gBWMEkV43hM	University, CY

Additional learning resources and motivated videos

There are different approaches in curriculum development and curriculum: A "lighter" option with a more superficial and fun presentation of the learning material, with the aim of paying attention to the applications of AI and "More serious" option, associated with a systematic and in-depth study of the basics of the discipline with a certain degree of formalization. Both options have disadvantages and advantages. The first is suitable for students from non-specialized general education schools. The second option is associated with more risks associated with both insufficient basic training of students and the need for more in-depth additional specialized training of teachers. Each of the approaches is related to: creating an appropriate curriculum; structuring the curriculum according to the school methodology; providing interdisciplinary links with other school subjects; creating a system of learning tasks for the individual main topics of classical and "modern" AI.

When developing additional learning resources on individual topics and modules, it is important to structure the learning content in relation to the learning content framework defined by the consortium and according to the defined target digital competencies. This template (Fig. 4) contains the following main parts:

- Title of additional learning resource
- Reference Module and topic
- Abstract of the proposed learning resource (no more 150 words)
- Content
- Target digital competencies, according to the digital competence framework adopted by the consortium
- School grades in which the use of this training resource is appropriate
- Resources and links with files detailing the additional information presented (pdf, pptx, etc.)
- Partner in the consortium, that proposed this learning resource.

Additional resources. Presentations, interactive resources, sample tasks and practical exercises	
Title	Title
Reference Module and topic	To which C1 module and which topic
Abstract	Maximum : 150 words
Content	

Targeted digital competencies	Digital competences according to Digicomp Framework in R2.A1
School Grades	
Resource	files detailing the additional information presented (pdf, pptx, etc.)
Links	
Partner	Partner who recommended the resource

Figure 4. Template for additional learning resources

An example application of this template is presented in Annex 2.

In pedagogical practice, it has been proven that the use of motivating video files with information related to the life and interests of students activates their attention and increases their activity in studying the educational material. Since artificial intelligence is a current topic, and training is largely informal, these motivational videos can greatly contribute to increasing the effectiveness of the learning process. Based on this, the consortium partners have selected a pool of a large amount of video files related to various topics of the learning content of the specified modules, which will be available together with the other digital learning resources from the online learning platform being developed.

In order to more clearly define what the content of the video file is, for which topics, modules and classes it is suitable, as well as with which of the defined digital competences it is related, we developed a special template (Fig.5).

Additional resources. Videos	
Title	Title of video
Reference Module and topic	To which C1 module and which topic
Abstract	Abstract and short content (max 150 words)
Targeted digital competencies	Digital competences according to Digicomp Framework in R1 and R2.A1
School Grades	
Duration (min)	
Link	
Partner	Partner who recommended the resource

Figure 5. Template for additional resource - video file

Annex 3 presents an example template for a video file.

To support and motivate students in the process of their learning on various AI topics, the partners have collected and provided a pool of motivational video files, which we can see in the next Table 5.

Table 5. Additional video files

№	TOPIC	LINK
P1. PLOVDIV UNIVERSITY, BG		
1	Python and Application of A* Algorithm	https://youtu.be/iWemY6CRIR0
2	Mini-Max Algorithm	https://www.youtube.com/watch?v=l-hh51ncgDI
3	What is Genetic Algorithms?	https://www.youtube.com/watch?v=1i8muvzZkPw
4	8-puzel problem solving by serching	https://www.youtube.com/watch?v=nmWGhb9E4es
5	Map coloring in Prolog	https://www.youtube.com/watch?v=6XD7vBbywMc
6	Family relations Greek gods	https://drive.google.com/file/d/1xCGjNHPuRAgJKO-iQAY8wCnckMtAkYon/view?usp=share_link
7	A* Algorithm In Artificial Intelligence	https://youtu.be/Mb1srg1ON60
8	Hill Climbing Algorithm in Artificial Intelligence with Real Life Examples	https://youtu.be/3SiWtAnUROs
9	Knights and Knaves in Prolog	https://youtu.be/oEAa2pQKqQU
10	Expert Systems Examples in Prolog	https://youtu.be/JYsC7Y_t410
P2. INSTITUTO POLITECNICO DO PORTO, PT		
1	Cyber Joe: AI Mentor for MIT Media Lab Students of 2050	https://youtu.be/iWemY6CRIR0
2	NVIDIA Maxine: Reinventing Real-Time Video Communications with AI	https://www.youtube.com/watch?v=3GPNsPMqY8o
3	Being Virtual and Virtual Beings	https://www.youtube.com/watch?v=se6eSBT6D1Y
4	The Future of AI in Education	https://www.youtube.com/watch?v=FX2AAUGf42Q
5	How Squirrel AI Learning Is Shaking Up Education	https://www.youtube.com/watch?v=eHab0NvT8FQ
6	AI Learns to Play Super Mario Bros	https://www.youtube.com/watch?v=CI3FRsSAa_U&ab_channel=Chrispresso_
7	Amazon intelligent shopping cart demo	https://www.youtube.com/watch?v=miCGDT8L17c&ab_channel=RichDeMuro
8	A.I. Learns to play Flappy Bird	https://www.youtube.com/watch?v=WSW-5m8lRMs&t=326s&ab_channel=CodeBullet
9	Inside Amazon's Smart Warehouse	https://www.youtube.com/watch?v=IMPbKVb8y8s&ab_channel=TechVision
10	How the World Cup's AI instant replay works	https://www.youtube.com/watch?v=C164kYMGV1A&ab_channel=Vox_
P3. SPIRU HARET UNIVERSITY, RO		
1	Neural Networks SPSS	https://www.youtube.com/watch?v=kckpYq0vL_8
2	Monte Carlo Simulation	https://www.youtube.com/watch?v=CWlo_UZABWI
3	The Current And Future State of AI - with Dr. Andrew Ng,	https://www.youtube.com/watch?v=lYhwAmZ-Kic
4	Enterprise AI Strategy (with Landing AI)	https://www.youtube.com/watch?v=Y7fH2iT1m7Q
5	New AI chatbot 'ChatGPT' interviewed on TV	https://www.youtube.com/watch?v=GYeJC31JcM0
6	Everyday applications of AI	https://www.youtube.com/watch?v=MpR6JZdQ4B0

P4. IVAN APOSTOLOV SCHOOL BG		
1	Algorithms explained (Peanut butter and jelly sandwich)	https://www.youtube.com/watch?v=okkIyWhN0iQ
2	Artificial gamer (00:20:10 - 01:50:00)	https://youtu.be/J0KPNpro2J8?t=1210
P6. IASA		
1	Introducing Envision Glasses: AI-powered smartglasses for the Blind & Visually Impaired	https://www.youtube.com/watch?v=9ehENnq2EFo
2	How China Is Using Artificial Intelligence in Classrooms	https://www.youtube.com/watch?v=JMLsHI8aV0g
3	9Most Advanced AI Robots - Humanoid & Industrial Robots	https://www.youtube.com/watch?v=Jky9I1ihAkg
4	Watch Ameca the humanoid robot in its FIRST public demo	https://www.youtube.com/watch?v=LzBUm31Vn3k
5	Future of AI | Future of Artificial Intelligence 2023	https://www.youtube.com/watch?v=dv9q7Ema40k
6	The 5 Biggest Artificial Intelligence (AI) Trends In 2023	https://www.youtube.com/watch?v=QhRLsssQoeM
7	Star Tech: No check-out at UAE's first AI grocery store	https://www.youtube.com/watch?v=rhj7iYY0vuY&t=31s
8	Saving Lives with AI | Freethink	https://www.youtube.com/watch?v=VePHPymCy2U
9	Meet Grace, the healthcare robot COVID-19 created | Celebrity Humanoid Robot Sophia | Robot Nurse	https://www.youtube.com/watch?v=6lcyBTis17g
10	What is Artificial Intelligence? | AI for Kids | Introduction to Artificial Intelligence | Eduonix	https://www.youtube.com/watch?v=NpFNH_8nEvI
P7. DOUKAS SCHOOL		
1	What is ChatGPT? OpenAI's Chat GPT Explained	https://www.youtube.com/watch?v=o5MutYFWsM8
2	AI Experiments: Bird Sounds	https://www.youtube.com/watch?v=31PWjb7Do1s
3	DALL·E 2 Explained	https://www.youtube.com/watch?v=qTgPSKKjfVg
4	How AI works in everyday life | Google A	https://www.youtube.com/watch?v=oJC8VIDSx_Q&ab_channel=Google
5	How does facial recognition work?	https://www.youtube.com/watch?v=YX8BzK_LU0E&ab_channel=InterestingEngineering
6	Facial Recognition: What you need to know about tech that knows you	https://www.youtube.com/watch?v=hgTBLLMtpUA&ab_channel=CNET
7	What is a dataset?	https://www.youtube.com/watch?v=eHoZnQmSEzs&ab_channel=ElonUniversityPoll
8	What is Speech Recognition?	https://www.youtube.com/watch?v=uSNUmJffK4c&ab_channel=Deepgram
9	What is a digital assistant?	https://www.youtube.com/watch?v=dqmJRScuZnE&ab_channel=SwissRe
10	Google Duplex: A.I. Assistant Calls Local Businesses To Make Appointments	https://www.youtube.com/watch?v=D5VN56jQMWM&t=181s&ab_channel=JeffGrubb%27sGameMess
P8. UNIVERSITY OF CYPRUS		
1	Trustworthy AI: Overview of the 7 requirements for Trustworthy AI	https://www.youtube.com/watch?v=9ehENnq2EFo
2	What is AI Ethics?	https://www.youtube.com/watch?v=aGwYtUzMQUk&t=118s&ab_channel=IBMTechnology
3	The three big ethical concerns with artificial intelligence	https://www.youtube.com/watch?v=1LyacmzB1Og&t=3s&ab_channel=MaRSDiscoveryDistrict
4	AI FOR GOOD - Ethics in AI	https://www.youtube.com/watch?v=vgUWKXVvO9Q&ab_channel=XPRIZE

5	AI Ethics Awareness Video	https://www.youtube.com/watch?v=hM9ziCAHI1o&ab_channel=SingaporeComputerSociety
6	Artificial Intelligence: The Ethical and Legal Debate	https://www.youtube.com/watch?v=5pM6NFb4tqU&ab_channel=EuropeanParliament
7	What is an Ethical Artificial Intelligence? Mozilla Explains	hhttps://www.youtube.com/watch?v=xoue4-ohk1Y&ab_channel=Mozilla
8	The Real Danger Of ChatGPT	https://www.youtube.com/watch?v=AAwbvGywdOc&ab_channel=Nerdwriter1
9	Jordan Peterson's Disturbing Warning About AI and ChatGPT...	https://www.youtube.com/watch?v=mUkTz_1uzSs&ab_channel=ModernWisdom
10	7 Ethical Issues with AI That YOU Should Know About	https://www.youtube.com/watch?v=KyB7NSWEODE&ab_channel=ArunaPattam

All learning resources developed will be available for use from the online platform, which will be developed as Result 3.

3. THREE DAYS TRAINING PROGRAMME (R2/A3)

The development of the training modules and the implementation and validation by piloting the training course through the C2 course with teachers and facilitators aims to ensure security and sustainability in student learning. The harmonization of learning objectives and approaches in AI education in the participating European countries is one of the main tasks of the project and this would greatly facilitate the transfer of knowledge to the different subjects within the curriculum. In this way, European teachers and learning facilitators will not only have a course to answer the question of what AI is, but also a course to teach them how to use and apply it in the teaching process.

Short-term pilot training and evaluation of the C2 training course was developed under R2. The training covers project results R1, R2 and part of R3.

Our consortium defined a training program with teachers over 3 days with 3 modules per day plus practical work, implementation, piloting and validation recorded in the MOOC. This course should be open to a limited number of external teacher participants from associated partners or others, without any funding from the project. The presence of external tutors increases the quality of the validation process and helps to obtain wider feedback to improve the final R2 result, while also discussing elements related to R3. The course is developed in English, as the main terminology of AI exists primarily in this language. It is undeniable that the teachers of the future must have the competence to adapt the teaching materials to the language they teach.

Expectations from the organization and conduct of this training course require:

1. evaluating the validation process, piloting the content with teachers and implementing a type of peer review when course modules are delivered by different partner participants
2. during the course the project will be able to develop the modules into a video that can be used for virtual online learning MOOC development
3. Critical discussions during the course will facilitate the further development of policy recommendations under R3 activities
4. participants will develop as part of the practical training a new AI-L&C plan that can be uploaded to the AI-Education Observatory

5. participants will develop the necessary competencies to become multipliers of the results of the FACILITATE-AI project. Role plays will be used to facilitate the practical part.

Two participants from each partner organization and one teacher with a high level of motivation and knowledge in STEAM training participate in the C2 experimental training. Additionally, teachers and pedagogical specialists from the organizers of the event are included.

The project outputs included in this learning activity are R1, R2, as well as the initial R3 activities. This C2 course learning activity is implemented as a pilot activity with teachers and learning facilitators, which will provide real-world testing and useful feedback to improve the course modules and at the same time discuss the R2 policy recommendations.

Participant feedback is recorded to be used as a MOOC and also to be used to assist partners in designing Multiplication events and discussions with teachers, school principals and authorities outside partner organizations. Participation of teachers from associate partners and other external specialists will be encouraged so that the course of the project can receive a more critical evaluation from people outside the consortium. The three-day training also provides hands-on activity, as participants will be asked to create a new learning plan and creativity for artificial intelligence as part of the course completion requirement.

The course program was developed by the project consortium participants. It is organized in the vicinity of Athens, Greece by partner Doukas School. The course curriculum contains 4 main modules (Table 6):

- Module 1: Motivation, Creative Resources and Ethics in Education – 90’
- Module 2: Facilitate-AI Online Platform – 90’
- Module 3: Nine Learning and Creativity (L&C) Plan Presentations – 270’
- Module 4: Practicum: Implementation by Trainees – 360’

Table 6. C2 Course curriculum

№	TRAINING MODULES		SOURCE 1 (PPT)	SOURCE 2 (Video)	SOURCE 3 (PDF)
I	**MODULE 1: Motivation, Creative Resources and Ethics in Education – 90’**				
		GR-Doukas School, BG-School, CY – UCY	Module 1-Presentation	Video-Module 1	L&C Plan
II	**MODULE 2: Facilitate-AI Online Platform – 90’**				
		BG– School			

III	**MODULE 3: Nine Learning and Creativity (L&C) Plan Presentations – 270'**				
1.	**Module 3.1** - *Solving Problems of movement, speed, organization of our movement within the city with the use of AI tools*	CY – CyMS	Module 3.1 - Presentation	Module 3.1. - Video	Module 3.1.- Learning Plan
2.	**Module 3.2** - *Prolog in the service of AI*	BG – Uni	Prolog in AI - Presentation	Prolog in AI - Video	Module 3.2 – Learning Plan
3.	**Module 3.3** - *Image Classification*	PT – Uni	Image Classification- Presentation	Find the zombies - Video	Module 3.3 – Learning Plan
4.	**Module 3.4** - *Pathway to Innovation*	RO – Uni	Pathway to innovation - Presentation	Pathway to innovation - Video	Module 3.4 – Learning Plan
5.	**Module 3.5** - *AI in STEAME*	BG – School	AI in STEAME - Presentation	AI in STEAME - Video	Module 3.5 – Learning Plan
6.	**Module 3.6** -*Guess who*	IT - School	Guess who - Presentation	Guess who - Video	Module 3.6 – Learning Plan
7.	**Module 3.7** - *AI Profession Orientation Chatbot*	GR - IASA	AI Profession Orientation Chatbot - Presentation	AI Profession Orientation Chatbot - Video	Module 3.7 – Learning Plan
8.	**Module 3.8** - *Digital Assistants*	GR – Doukas School	Digital Assistant - Presentation	Digital Assistant- Video	Module 3.8 – learning Plan
9.	**Module 3.9 - Elements of AI Ethics**	CY - Uni	Elements of AI Ethics - Presentation	Elements of AI Ethics - Video	Module 3.9 – learning Plan
IV	**MODULE 4: Practicum: Implementation by Trainees – 360'**				
1.	Practicum: Part A	IPDP, IASA	Implementation by Trainees (Part A)	Practicum Activity & Presentations by Trainees	Module 4 - Practicum - Learning Plan
2.	Practicum: Part B	RO – UNI, GR - DOUKAS SCHOOL	Implementation by Trainees (Part B)		
3.	Practicum: Part C	BG - School, CY – CYMS	Implementation by Trainees (Part C)		
4.	Practicum: Part D	IT- ITC BG – UNI GR – DOUKAS	Implementation by Trainees (Part D)		

Module 1 - Motivation, Creative Resources and Ethics in Education

Introduction and Broad Description of the Context and Goal of the area/topic addressed

This module focuses on integrating artificial intelligence (AI) into education. The goal is to provide educators with the knowledge and skills to effectively use AI in teaching and learning. Educators will explore practical applications of AI in education, learn fundamental AI concepts and tools, and enhance motivation and engagement using digital game elements. They will also develop digital literacy and skills for utilizing digital data and resources in an AI environment. Educators will adapt their teaching methods and content to introduce and teach AI concepts to students, promoting critical thinking and problem-solving. They will gain an awareness of AI's potential transformation in education, including personalized approaches and data analysis. Ethical considerations and biases in AI development will be explored, emphasizing the importance of transparency and responsible use of AI. Educators will gain practical knowledge in building AI models and understand the impact of AI on society. The overall goal is to foster an understanding of AI's potential in education, develop AI ethics, and prepare educators to navigate the AI-driven future while empowering their students for success in the digital age.

Learning objectives and learning outcomes:

- Describe practical applications of AI in various real-world contexts, including education.
- Identify of the fundamental AI concepts, algorithms, and tools.
- Enhance motivation and engagement through the use of digital game elements in teaching AI.
- Enhance digital literacy and skills for utilizing existing digital data and resources in an AI environment.
- Adapt teaching methods and content to effectively introduce and teach AI concepts to students.
- Cultivate an awareness of AI's potential transformation in teaching and learning practices.
- Explore AI's potential for enhancing teaching and learning experiences through personalized approaches and data analysis.
- Gain practical knowledge and skills in building AI models, including training, validation, and testing.
- Promote critical thinking and problem-solving abilities through AI-based real problems.
- Explore the ethical considerations and potential biases in AI development and implementation.
- Develop an attitude of AI ethics and the importance of transparency in AI systems.
- Foster the AI's impact on society and everyday life, including ethical considerations.

Digital Competencies:

- Adapting accessibility and inclusion
- Adapting differentiation and personalization
- Adopting new methods of teaching and learning
- Creatively using digital technology
- Enhancing the effectiveness of teaching
- Interacting through digital technologies
- Enhancing the activities for learning
- Exploring information and digital content

- Interacting through digital technologies
- Actively engaging learners
- Collaborating through digital technologies
- Adapting technology to create knowledge
- Awareness of digital division and exclusion
- Awareness of guidelines for ethical systems

Module 2 - Facilitate-AI Online Platform

Dynamic Online Learning Environment with OER

Dynamic Online Learning Environment with OER on AI in interdisciplinary STEAME school subjects with a set of Blueprint Policy Recommendations and the FACILITATE AI courses.

FACILITATE-AI Observatory

The Observatory is a tool mainly for schoolteachers to support a dynamic and adaptive STEAME Curriculum in their schools. The content is updated and growing continuously, so all teachers in Europe and beyond can stay informed, but also to publish their own work and material.

Module 3 - Nine Learning and Creativity (L&C) Plan Presentations

Module 3.1. Solving Problems of movement, speed, organization of our movement within the city with the use of AI tools

Introduction and Broad Description of the Context and Goal of the area/ topic addressed:

Solving problems in mathematics and physics can be a very boring process for students. Solving problems in their real lives can be much more interesting, but sometimes it can be a very difficult process. An approach that links and combines the two with the use of some AI tools that are already available on their mobile phones, perhaps better pique students' interest. The combination of teaching between subjects such as mathematics, physics, history, computer science to approach a real need of our daily lives, seems to be now necessary.

Learning outcomes and learning objectives

- to evaluate, select, and use appropriate digital tools and technologies to represent capabilities and basic AI algorithms for planning, decision making, problem solving and learning
- to apply different digital tools and technologies to define problem and select appropriate way for problem solving
- to evaluate different digital tools and technologies that can be used to create knowledge and to innovate processes and products.
- to adapt appropriately various digital tools and technologies for knowledge formation in the learning process.
- to select, identify and evaluate appropriate learning games for teaching and learning
- to organize and share the learning resources
- to evaluate digital resources, connected with teaching through games.
- to select games developed using various AI-technologies and algorithms
- to interact through a variety of digital technologies
- to understand appropriate digital communication means for a given context.

- to share data, information and digital content with other participants in the learning process through appropriate digital technologies.
- to use digital tools and technologies for collaborative learning processes, and for co-creation of new data, resources and knowledge.

Digital Competencies:

- Creatively using digital technology
- Using different digital tools and technologies for problem solving
- Selecting, organizing and sharing of data
- Evaluating information and digital content
- Interacting through digital technologies
- Sharing through digital technologies
- Collaborating through digital technologies

Additional resources and AI tools:

- Moovit: Real Time Worldwide Public Transit App
- Google Maps
- Explore the Uber Platform
- SmartGuide: Digital audio guide for your visitors

Module 3.2. – Prolog in the service of AI

Introduction and Broad Description of the Context and Goal of the area/topic addressed

This module aims to help teachers introduce the basic concepts, methods and techniques of classical and modern artificial intelligence, and in particular the ways of representing and processing semantic information, as well as the capabilities of Python and the logic programming language Prolog. To consider an application of semantic information processing and logic programming to describe and draw logical conclusions in the field of family relationships.

Learning objectives and learning outcomes

- To create and modify learning content related to knowledge representation, logic programming and use relevant examples and real-life situations.
- To organize and share learning resources
- To evaluate digital resources related to teaching and to interact through various digital technologies
- To share data, information and digital content with other participants in the learning process
- To use digital tools and technologies for collaborative learning processes and to co-create new data, resources and knowledge

Digital Competencies:

- Evaluation data information and digital content
- Managing data information and digital content
- Integrating and re-elaborating digital content
- Programming
- Creatively using digital technology
- Using different digital tools and technologies for problem solving
- Active engagement of learners
- Adopting new methods of teaching and learning

- Increasing the effectiveness of teaching

Additional resources and AI tools:

- SWI Prolog, https://www.swi-prolog.org/

Module 3.3 - Image Classification

Introduction and Broad Description of the Context and Goal of the area/topic addressed:

Students will learn about the creation of image classification algorithms based on techniques from machine learning and deep learning. Focusing on a practical approach, foundational understanding of machine learning is detailed followed by practical examples during the initial introduction. Later students are presented with advanced concept from image classification in a project-based and inquiry-based learning supported by teachers that guide students. It is expected that students will be able to structure of an image-based dataset, the data collection process and how a Machine Learning model can be trained, evaluated, and used to automatically classify images into categories using neural networks autonomously and, in a competition-based activity.

Learning objectives and learning outcomes

- To know and apply the concepts of image classification
- Understand how to train models, evaluate model and model productionizing.
- To train machine learning models based on image datasets into a known category.
- Critically evaluate and compare multiple machine learning models according to objective criteria
- Understand the impact of data collection and model configuration on the quality of ML models

Digital Competences

- Applying algorithms
- Processing data and digital content
- Communicating computational thinking
- Creatively using digital technology
- Managing data and digital content
- Creatively using & interacting with digital technology
- Adapting technology to create knowledge
- Proposing creative solutions to problems

Additional resources and AI tools

- Knime.zip – a folder containing a knime installation with all plugins installed and configured for the lesson plan
- Workflows.zip – collection of knime workflows to demonstrate the application of neural networks, image preparation and classification.
- Kaggle.pdf – Instruction on how to host a Kaggle competition with the provided dataset to classify images as zombies or non-zombie.
- Dataset.csv – a dataset which contains different game characters which contains zombies and non-zombies samples that can be used as a starting point, to train a model
- Images.zip – a collection of images in different categories to be trained by the deep learning mode

Module 3.4 - Pathway to Innovation AI

Introduction and Broad Description of the Context and Goal of the area/topic addressed:

This workshop builds off prior activities involving choosing the most appropriate AI application for the task to be solved. Solving different problems manifested in current life and professional activities by means of AI tools.

Learning objectives and learning outcomes

- Understanding the need for innovation, its role in education, and for company/society level
- Acquisition of basic knowledge of innovation AI tools and practical implementations at the level of school/company;
- Knowledge of techniques and methods to stimulate creativity and innovation;
- Mastering the operation of innovation management by identifying leaders, innovative teams, and innovative networks;

Digital Competences

- Searching on the internet different AI tools and applications
- Choosing the appropriate AI tool/ app for the task to be solved
- Interacting and collaborating through AI technologies
- Reseach collaborating through AI technologies
- Awareness of risk associated with AI tools/apps
- Respecting safety and well-being

Instruments/Tools/Supporting Material/Resources to be used

- Open AI https://openai.com/
- Content creation (Copy.ai, Jasper, Surfer, Compose.ai, Dynos ~ Create & Share Engaging Digital Content),
- Text enhancement (Grammarly, Wordtune, Hemingway)
- Image generation (neural.love, Stable Diffusion, DALL·E 2, Illustroke), Image correction: InPaint https://theinpaint.com/
- Video creation (Fliki, Synthesia)
- Transcription (Otter)
- Slide decks and presentations (Beautiful.ai), Power Point generator https://app.presentations.ai/
- Research (genei)
- Automation (Zapier's OpenAI integration)
- Browsing Competition Activity (BowseAI)

Module 3.5. AI in STEAME

Introduction and Broad Description of the Context and Goal of the area/topic addressed:

In the 21st century, we cannot have technology without including AI in it. As an extensively researched and developed area, STEAME education also needs to address artificial intelligence and how we can use it to our own advantage – responsibly of course. Hands-on learning is what really interests students, so a practical approach needs to be used whenever possible. The learning activities are focused on doing and understanding. Students first understand the concept of AI and then use their tech knowledge to present the applications of AI with code. They are divided into teams and

tasked with figuring out different ways to use AI in Science, Business, Engineering and Art. The role of the teachers is crucial, as they are the facilitators of the whole learning process and need to understand a broad range of AI aspects.

Learning objectives and learning outcomes

- To recognize the different types of machine learning.
- To relate machine learning algorithms from games to real life problems.
- To identify problems that can be solved using AI.
- To discuss different ideas and concepts in AI freely.
- To explain the differences between the different types of machine learning.
- To apply basic machine learning knowledge in the creation of simple ML models.
- To understand the mathematics behind AI.
- To analyze scientific information properly.
- To classify data according to certain features.
- To assess students individually and as teams.
- To create simple ML models.
- To estimate whether a model is appropriate for a problem.
- To experiment with different models in solving a problem.
- To track the progress of students.

Digital Competences

- Actively engaging in Learning
- Creatively using & interacting with digital technology
- Exploring & evaluating information and digital content
- Critical navigation
- Developing digital content
- Managing data and digital content
- Actively engaging in communication
- Actively engaging in collaboration
- Collaborating through digital technologies
- Communicating computational thinking
- Communicating technology responsively
- Sharing through digital technologies
- Actively enabling in creation
- Creatively using digital technology
- Adapting technology to create knowledge
- Proposing creative solutions to problems
- Awareness of machine ethics
- Selecting, organizing and sharing of data

Instruments/Tools/Supporting Material/Resources to be used:

- STEAME
- Learning with STEM
- MS PowerPoint – to create presentations for different STEAME areas
- Dall-E 2 – to create images using AI
- Google Colab – for presenting ML models easily

- MS Excel and Kaggle to examine different datasets
- E-learning platform
- Online communication platform – Google Meet, Discord, etc.

Module 3.6. Guess who?

Introduction and Broad Description of the Context and Goal of the area/topic addressed

The intent of this module is to support teachers to implement PBL related to AI to help teachers who are not AI experts and students to understand what AI is and show some elements of how it works. Show how the human reasoning process that leads to making decisions, such as a "decision tree", is the basis of some AI applications, showing how tools that use AI are able to analyze and organize data and use these data to make predictions. This can lead to a transformation in the way of teaching and learning.

Learning objectives and learning outcomes

- To design, plan and implement the use of digital technologies in the different stages of the learning process
- To use digital technologies to offer timely and targeted guidance and assistance
- To use digital technologies to foster and enhance learner collaboration
- To enable learners to use digital technologies as part of collaborative assignments, as a means of enhancing communication, collaboration and collaborative knowledge creation
- To experiment with and develop new forms and formats for offering guidance and support
- To use digital technologies to support learners' self- regulated learning i.e. to enable learners to plan, monitor and reflect on their own learning, providing evidence of progress, share insights and come up with creative solutions
- To ensure accessibility to learning resources and activities, for all learners, including those with special needs.
- To use digital technologies to address learners' diverse learning needs, by allowing learners to advance at different levels and speeds, and to follow individual learning pathways and objectives.
- To use digital technologies to foster learners' active and creative engagement with a subject matter.
- To use digital technologies within pedagogic strategies that foster learners' transversal skills, deep thinking and creative expression.
- To open up learning to new, real-world contexts, which involve learners themselves in hands-on activities, scientific investigation or complex problem solving

Digital Competences

- Enhancing the effectiveness of teaching
- Interacting through digital technologies
- Collaborating through digital technologies
- Self-regulated learning
- Using assessment strategies
- Providing feedback to learners
- Adapting accessibility and inclusion
- Adapting differentiation and personalisation
- Actively engaging learners

Instruments/Tools/Supporting Material/Resources to be used:

- https://cdn.iste.org/www-root/Libraries/Documents%20%26%20Files/Artificial%20Intelligence/AIGDEL_0820-red.pdf
- www.PangeaFormazione.com
- https://sliceofml.withgoogle.com/#/
- https://it.akinator.mobi/
- https://www.youtube.com/c/SefikIlkinSerengil/featured
- https://sefiks.com/2018/08/27/a-step-by-step-cart-decision-tree-example/
- http://elearning-let.unicas.it/home/wp-content/uploads/2018/03/Didattica-Lezione_03.pdf
- https://blog.osservatori.net/it_it/intelligenza-artificiale-funzionamento-applicazioni
- http://www.rivistabricks.it/2020/03/03/integrare-coding-e-pensiero-computazionale-nella-didattica/

Module 3.7. AI Profession Orientation Chatbot

Introduction and Broad Description of the Context and Goal of the area/topic addressed

Career guidance in the era of the fast changing employment world is crucial for today's young students. So far, only limited research has been conducted on using artificial intelligence to support guidance across primary and secondary education and professions. This L&C Plan will provide a guide to create an AI chatbot that will help students explore professions that they might be interested in, according to their hard and soft skills and their personality. In this way students will value the importance of using artificial intelligence to support career guidance in education and get familiarized with cognitive intelligence.

Learning objectives and learning outcomes

- Understand basic AI methods used for chatbot development
- Develop a cognitive AI based chatbot
- Explore how specific soft skills are related to specific professions
- Self-reflect, communication skills enhancement

Digital Competences

- Handling basic functionalities of Microsoft Excel would be useful when building their own chatbot in the proposed platform.
- No programming knowledge is needed.

Additional resources and AI chatbots;

- YouScience is an online platform which utilizes an AI-driven virtual career coach to help students explore their strengths, interests, and career options. Website: https://www.youscience.com/
- Xello is an online platform that helps students in grades 6-12 explore career and college options though an interactive chatbot. Website: https://xello.world/
- MyMajors is an online resource that assists students in discovering their academic and career paths. It features a chatbot that engages with students to identify their interests, strengths, and goals, and provides recommendations for potential majors and careers. Website: https://www.mymajors.com/

- ChatGPT can be used as a resource for professional orientation. It can provide information on different careers, answer questions, and offer guidance based on the knowledge it has been trained on. – Students explore
- Bard generative artificial intelligence chatbot developed by Google, based initially on the LaMDA family of large language models and later the PaLM LLM https://bard.google.com/
- Explore tools for developing AI chatbots
- Juji Studio combines cognitive AI with intuitive graphical user interface (GUI), enabling you to build the best AI chatbots without code (https://juji.io/no-code-ai-chatbot-builder/)
- Flowxo supports building chatbots for multiple messaging platforms, including Facebook, Messenger, Slack (https://flowxo.com/)
- Botsify is a chatbot development platform that allows students to build AI chatbots without coding (https://botsify.com/)

Module 3.8. Digital Assistants

Introduction and Broad Description of the Context and Goal of the area/topic addressed

Digital Assistants (e.g. ChatGPT, Alexa, Siri, Google Assistant) have already been part of our everyday life so, we need to teach & learn our students the way to use them. Recently a break-through new tool – AI chatbot was presented and it was adopted by Education. Consequently, new educational scenarios were created, while accomplishing the objectives of efficient student learning. The learning plan is based on the collaboration of the Departments of Digital Education & Foreign Languages.

Learning objectives and learning outcomes

- Learners understand the way digital assistants operate and process information according to the datasets of this AI environment
- Learners exploit new Vocabulary by getting familiar with AI and geographical features vocabulary
- Learners are introduced to a new grammar point, identifying the need of incorporating digital assistant in the learning process, getting with the specific grammar point: present tenses
- Learners improve knowledge of AI environment features in order to implement it throughout
- Learners should be able to successfully understand and apply the basic principles related to the use and exploitation of this environment
- Learners should be able to properly pronounce relevant vocabulary
- Learners should be able to ask the digital assistant and the get the right answer
- Learners should be able to use targeted grammatical structures meaningfully and appropriately in oral and written production.
- Learners should be able to distinguish between conventional and digital assisted lesson
- Learners should be able to work in teams and apply research methods to evaluate AI environment

Digital Competences

- Exploring information and digital content
- Interacting through digital technologies
- Collaborating through digital technologies
- Awareness of digital division and exclusion
- Respecting safety and well-being

Instruments and additional resources:

- ChatGPT: OpenAI
- Alexa: Amazon - What is Alexa?
- Siri: Siri - Apple
- Google Assistant: Google Assistant, your own personal Google
- climate.ec.europa.eu/climate-change/causes-climate-change_en
- climate.ec.europa.eu/climate-change/causes-climate-change_en#causes-for-rising-emissions
- www.un.org/en/climatechange/science/causes-effects-climate-change
- www.epa.gov/climatechange-science/causes-climate-change

Module 3.9. Elements of AI Ethics

Introduction and Broad Description of the Context and Goal of the area/topic addressed

This workshop builds off prior activities involving research and finding sources to justify an argument. Individually and in small groups, students conduct research using search engines, videos, articles, generative applications and that expose ethical pitfalls in an Artificial Intelligence area of their choice.

Learning objectives and learning outcomes

- define artificial intelligence (AI) in their own words, using technologies they encounter in their daily lives as examples,
- describe at least one example of an ethical issue pertaining to AI, along with its impact on society,
- recognize that AI systems create profiles to predict what online information people will find interesting, from their public data,
- identify the advantages and disadvantages of the decisions people make in response to online information determined by machine learning algorithms.
- recognize credible sources on the internet,
- summarize information from digital sources to support an argument, navigate online resources and cite sources appropriately.

Digital Competences

- Exploring information and digital content
- Interacting through digital technologies
- Collaborating through digital technologies
- Awareness of digital division and exclusion
- Awareness of guidelines for ethical systems
- Protecting privacy
- Respecting safety and well-being

Additional Resources and Supporting Material to be used:

- Paddlet
- Which face is real?
- Teachable Machine
- Animated Drawings
- Ethics Guidelines for Trustworthy Artificial Intelligence

- ChatGPT
- Evaluation of Module 3.9: Elements of AI Ethics
- Anex of Module 3.9 Elements of AI Ethics

Module 4: Practicum – Implementation by Trainees

Introduction and Broad Description of the Context and Goal of the area/topic addressed

In this Module, consortium members create distinct activities to equip high school teachers with effective tools for AI education. The goal is to engage students, foster real-world relevance, and encourage collaboration in AI learning.

Learning objectives and learning outcomes

The learning objectives and learning oucomes of the module include understanding AI concepts, designing effective activities, addressing teaching challenges, integrating hands-on experience, and promoting ethical considerations.

Digital Competences

By taking this module, participants will gain a range of competencies that will enhance their capabilities as AI educators. These competencies include:

- AI Knowledge: A comprehensive understanding of fundamental AI concepts, algorithms, and applications, empowering them to confidently teach AI topics to high school students.
- Pedagogical Skills: The ability to design and implement engaging and effective teaching activities that cater to the diverse learning styles of students in grades 7 to 12.
- Problem-Solving and Critical Thinking: The capacity to analyze challenges in AI education and devise innovative solutions to ensure successful knowledge transfer and student engagement.
- Hands-on Experience: Practical skills in implementing real-world AI applications and guiding students through interactive activities that involve AI technologies.
- Ethical Awareness: A heightened awareness of the ethical considerations surrounding AI and the capability to guide students in making responsible and ethical decisions when using AI.
- Collaboration and Communication: The capacity to collaborate effectively with peers and educators, fostering a community of AI enthusiasts, and the ability to communicate complex AI concepts in a clear and accessible manner.
- Adaptability: Flexibility in adapting teaching approaches to meet the specific needs of diverse student populations, ensuring an inclusive and engaging learning environment.

The training in this module is organized in groups and the following activities were implemented.

Activity 1: Pixels from prompts: understanding image generation

Link: https://huggingface.co/models

Goals: Understand how text-to-image generative models work and how they can be biased towards the images that are more prevalent online

Description: Have the students use any of the available text-to-image generative models. Suggest prompts that may be biased vs. prompts that are less likely (e.g., three little pigs vs. three little

dogs). Discuss with the students how generative models work, and how they "simply" learn the typical statistical distribution of the pixels for some concept and then generate it with slight variations, and how this is prone to bias and other problems when the concepts is associated with very repetitive images. Depending on the prompt it is possible to explore problems such as bias, the generation (and use by the model) of copyrighted material, or models that generate text without being explicitly programmed for it

Optional: use Google reverse image search to find similar images (possibly used as sources)

Activity 2: Diabetes Auto-Diagnosis

Link: https://bigml.com/

Description

- Use the platform to import a dataset regarding diabetes.
- Create a decision tree model that predict a diabetes diagnosis.
- Explore the decision tree and decision process
- Query the model with the interactive form
- Explore other models such as regression and state the differences in decision making and querying

Activity 3: Presentations with 3D assets

Link: https://alicevision.org/#meshroom

Description:

- Choose an interesting inanimate object to present to others
- Use a camera to take photos about a in different angles, heights and distance
- Use the software to import the images and explore algorithm from computer vision.
- Review all images and take out images out of focus and with bad quality
- Create and export the model
- Import to the powerpoint presentation
- If possible, print a physical copy using a 3D printer

Activity 4: AI in education

The software: https://studio.d-id.com/ - talkative picture

Use ChatGPT to generate text for a video And Visla to generate IT

Activity 5: AI For Biology

The software: Pl@ntNet

The pupil should upload a picture with lavender to see the software match

The software: Craiyon

The pupil should generate photos with lavender

The software: PPT generate

The pupils should open the app and add the text, such as" Lavender taxonomy and health benefits"

The software: Kahoot evaluation

The children must log in kahoot and answer the question for lavender

Activity 6: Tool IT

The Tools: Multiple tools, students can choose any

Use AI tools that you've never used before or find a new application of a tool you're already familiar with

- Figure out the best tool to fit their mood or favourite subject
- Analyse it thoroughly
- Present it in front of the class

Activity 7: Storytelling – AI vs ME

The Tools: ChatGPT

Beat AI at storytelling! Prove that real intelligence is the better storyteller!

- Write down a short story of 50 words, using 5 keywords
- Ask AI to do the same for you with a proper prompt
- Compare the stories in your class and vote for the most compelling one
- Do the second step once again to see if AI will outdo its initial performance
- Enjoy your stories and try different versions of the activity

Activity 8: AI Examintion

The Tools: Visus

Get AI to examine you on the material covered by your least favorite school subject!

- Let your teacher upload your book to Visus
- Eliminating subjectivity, Visus will ask you questions based on what you've covered from the group
- Try to answer them the best you can

Activity 9: Historical Interviews

The Tools: HelloHistory

Interview your favorite historical figure and ask them questions that your History book cannot answer!

- Choose a historical figure
- Compose questions that you need answers to
- Do an interview with the historical figure
- Present your results in front of your class

Activity 10: Tell the Real from the Fake

The Tools: AIVA, DALL-E-2

Try to distinguish real from fake pieces of art!

- Let your teacher make AIVA compose a classical music piece resembling the work of some composer
- Listen to the fake piece and a real piece
- Try to tell which is which
- Do the same, but for a painting, done by DALL-E-2 in the style of some well-known artist

Activity 11: Relive History

The Tools: DALL-E-2

Visualize never-before seen history!

- For your history class, find an event that isn't well documented visually (e.g. ancient history)
- Ask DALL-E-2 to create pictures depicting the event based on actual texts found on the web
- Show the event to your class

Activity 12: Model AI-UN

The Tools: ChatGPT

Solve world's problems… as created by AI!

- Use AI to generate a random world crisis scenario
- Let AI assign random countries to random students. Let's increase the randomness as much as possible
- Now that all students represent different countries, they need to work together in order to resolve the crisis
- Propose a resolution of the UN to the AI and consider its response
- Work together until the crisis is resolved

Activity 13: AI For Oceans

The Game

The Learning Plan

The idea: Ecology and AI

Explore how AI and machine learning can be used to address world problems.

- The students have to find the most polluted places in the oceans and have to collect some pictures of polluted places.
- What is Machine Learning
- The students train the robot to recognize the trash by using machine LEARNING by images.

Activity 14: Simplified Algorithm for Image Recognition

Presentation: Image Recognition

The activity is helping the student to understand how a simplified algorithm for image recognition works and the general architecture of a Neural Network*.

The students are divided in groups and each group will add as one of the layers of the Neural Network.

Activity 15: Slice of Machine Learning

Application: Slice of Machine Learning

Slice of Machine Learning shows how AI can analyze training objects (e.g., like a pizza) and make decisions based on criteria in a decision tree. Once they have completed the activity, they can review the main acquired concepts:

- The AI tool is called a classifier.
- What are a data set, different use of training set and test set, overfitting, accuracy target
- This simple activity can also be use to collect feedbacks about the competence acquired so far

The features used in nodes and the order of the questions in the nodes and branches affect the accuracy of the AI's ability to decide if an item is a pizza.

Activity 16: Teachable Machine: Image-Audio-Pose

Application: Teachable Machine

"Teachable Machine" is a tool for easy recognizing images, sounds, and poses, in three steps:

- Gather and group examples into classes, or categories.
- Train the model, then instantly test it out to see whether it can correctly classify new examples.
- Export the model for any use (e.g., at websites)

The Learning Plans for each of the modules in the training course are presented in Annex 4 to this document.

(EN) CONCLUSION

Modern digital technologies pose new challenges to school education. They require a change in the organization and conduct of the learning process and changing the role of teachers - from mentors and lecturers to moderators and facilitators of learning.

AI technologies have the potential to alter and modify traditional approaches, methods, and teaching and learning technologies. AI applications are already being used to some extent in various aspects of school education, including establishing and analyzing learning outcomes, personalizing educational resources and the learning process, providing immediate feedback, and engaging students.

The implementation and use of intelligent learning systems, services and tools offer great opportunities to increase students' knowledge, build key competencies and support teachers in organizing personalized learning. In this way, teachers can focus on more important activities such as lesson planning and student support, while using automated grading and feedback systems.

Despite these advantages, the use of AI in education (AIEd) also raises important ethical questions and issues. These problems are largely related to exacerbating existing inequalities in the education system, as AI algorithms often tend to support biases and distort information embedded in machine learning algorithms. Furthermore, for teachers to effectively use AI in their teaching practices, they need appropriate training and support.

This document presents one approach to organizing a qualification course for training teachers and facilitators in Artificial Intelligence. It presents the process for defining the necessary digital competencies that all participants in the learning process must possess; additional study materials are

presented on separate modules and topics; the course curriculum is defined and the results of the C2 training course held by the project consortium in Athens in the summer of 2023 are shared.

This e-book is intended for all teachers and facilitators who wish to gain knowledge, skills and competencies for teaching and using AI technologies with students in grades 7 to 12 of secondary school. It can also be used by people and official institutions in European countries who are responsible for the development of modern school education.

(GR) ΣΥΜΠΕΡΑΣΜΑ

Οι σύγχρονες ψηφιακές τεχνολογίες θέτουν νέες προκλήσεις στη Σχολική Εκπαίδευση. Απαιτούν αλλαγή στην οργάνωση και διεξαγωγή της μαθησιακής διαδικασίας και αλλαγή του ρόλου των εκπαιδευτικών - από μέντορες και διδάσκοντες σε συντονιστές και «διευκολυντές» της μάθησης.

Οι τεχνολογίες τεχνητής νοημοσύνης έχουν τη δυνατότητα να αλλάξουν και να τροποποιήσουν τις παραδοσιακές προσεγγίσεις, μεθόδους και τεχνολογίες διδασκαλίας και μάθησης. Εφαρμογές ΤΝ χρησιμοποιούνται ήδη σε κάποιο βαθμό σε διάφορες πτυχές της σχολικής εκπαίδευσης, όπως ο καθορισμός και η ανάλυση των μαθησιακών αποτελεσμάτων, η εξατομίκευση των εκπαιδευτικών πηγών και της μαθησιακής διαδικασίας, η παροχή άμεσης ανατροφοδότησης και η εμπλοκή των μαθητών.

Η εφαρμογή και η χρήση ευφυών μαθησιακών συστημάτων, υπηρεσιών και εργαλείων προσφέρουν μεγάλες ευκαιρίες για την αύξηση των γνώσεων των μαθητών, την ανάπτυξη βασικών ικανοτήτων και την υποστήριξη των εκπαιδευτικών στην οργάνωση εξατομικευμένης μάθησης. Με αυτό τον τρόπο, οι εκπαιδευτικοί μπορούν να επικεντρωθούν σε πιο σημαντικές δραστηριότητες, όπως ο σχεδιασμός του μαθήματος και η στήριξη των μαθητών, ενώ παράλληλα χρησιμοποιούν αυτοματοποιημένα συστήματα βαθμολόγησης και ανατροφοδότησης.

Παρά τα πλεονεκτήματα αυτά, η χρήση της τεχνητής νοημοσύνης στην εκπαίδευση (AIEd) εγείρει επίσης σημαντικά ηθικά ερωτήματα και ζητήματα. Τα προβλήματα αυτά σχετίζονται σε μεγάλο βαθμό με την επιδείνωση των υφιστάμενων ανισοτήτων στο εκπαιδευτικό σύστημα, καθώς οι αλγόριθμοι ΤΝ τείνουν συχνά να υποστηρίζουν προκαταλήψεις και να διαστρεβλώνουν πληροφορίες που ενσωματώνονται στους αλγόριθμους μηχανικής μάθησης. Επιπλέον, για να μπορέσουν οι εκπαιδευτικοί να χρησιμοποιήσουν αποτελεσματικά την ΤΝ στις διδακτικές τους πρακτικές, χρειάζονται κατάλληλη εκπαίδευση και υποστήριξη.

Το παρόν έγγραφο παρουσιάζει μια προσέγγιση για τη διοργάνωση ενός κύκλου μαθημάτων επιμόρφωσης για την κατάρτιση εκπαιδευτικών και «διευκολυντών» στην Τεχνητή Νοημοσύνη. Παρουσιάζεται η διαδικασία για τον καθορισμό των απαραίτητων ψηφιακών ικανοτήτων που πρέπει να διαθέτουν όλοι οι συμμετέχοντες στη μαθησιακή διαδικασία- παρουσιάζεται πρόσθετο υλικό μελέτης σε ξεχωριστές ενότητες και θέματα- καθορίζεται το πρόγραμμα σπουδών και μοιράζονται τα αποτελέσματα του εκπαιδευτικού κύκλου C2 που πραγματοποιήθηκε από την κοινοπραξία του έργου στην Αθήνα το καλοκαίρι του 2023.

Αυτό το ηλεκτρονικό βιβλίο απευθύνεται σε όλους τους εκπαιδευτικούς και «διευκολυντές» που επιθυμούν να αποκτήσουν γνώσεις, δεξιότητες και ικανότητες για τη διδασκαλία και τη χρήση τεχνολογιών ΤΝ με μαθητές των τάξεων 7 έως 12 της δευτεροβάθμιας εκπαίδευσης. Μπορεί επίσης

να χρησιμοποιηθεί από άτομα και επίσημους φορείς στις ευρωπαϊκές χώρες που είναι υπεύθυνοι για την ανάπτυξη της σύγχρονης σχολικής εκπαίδευσης.

(IT) CONCLUSIONE

Le moderne tecnologie digitali pongono nuove sfide all'istruzione scolastica. Richiedono un cambiamento nell'organizzazione e nella conduzione del processo di apprendimento e un cambiamento nel ruolo degli insegnanti - da mentori e docenti a moderatori e facilitatori dell'apprendimento.

Le tecnologie di intelligenza artificiale hanno il potenziale per alterare e modificare gli approcci, i metodi e le tecnologie di insegnamento e apprendimento tradizionali. Le applicazioni dell'intelligenza artificiale sono già utilizzate in una certa misura in vari aspetti dell'istruzione scolastica, tra cui la definizione e l'analisi dei risultati dell'apprendimento, la personalizzazione delle risorse educative e del processo di apprendimento, la fornitura di feedback immediati e il coinvolgimento degli studenti.

L'implementazione e l'uso di sistemi, servizi e strumenti di apprendimento intelligenti offrono grandi opportunità per aumentare le conoscenze degli studenti, sviluppare competenze chiave e supportare gli insegnanti nell'organizzazione dell'apprendimento personalizzato. In questo modo, gli insegnanti possono concentrarsi su attività più importanti come la pianificazione delle lezioni e il supporto agli studenti, utilizzando al tempo stesso sistemi di valutazione e feedback automatizzati.

Nonostante questi vantaggi, l'uso dell'intelligenza artificiale nell'istruzione (AIEd) solleva anche importanti questioni etiche e problemi. Questi sono in gran parte legati all' esacerbazione delle disuguaglianze esistenti nel sistema educativo, poiché gli algoritmi di intelligenza artificiale spesso tendono a supportare pregiudizi e distorcere le informazioni incorporate negli algoritmi di apprendimento automatico. Inoltre, affinché gli insegnanti possano utilizzare efficacemente l'intelligenza artificiale nelle loro pratiche didattiche, hanno bisogno di formazione e supporto adeguati.

Questo documento presenta un approccio per organizzare un corso di qualificazione per la formazione di insegnanti e facilitatori in Intelligenza Artificiale. Presenta il processo per definire le competenze digitali necessarie che tutti i partecipanti al processo di apprendimento devono possedere; materiali di studio aggiuntivi sono presentati su moduli e argomenti separati; viene definito il curriculum del corso e condivisi i risultati del corso di formazione C2 tenuto dal consorzio di progetto ad Atene nell'estate 2023.

Questo e-book è destinato a tutti gli insegnanti e i facilitatori che desiderano acquisire conoscenze, abilità e competenze per l'insegnamento e l'utilizzo delle tecnologie di intelligenza artificiale con gli studenti delle classi dal 7 al 12 della scuola secondaria. Può essere utilizzato anche da persone e istituzioni ufficiali dei paesi europei responsabili dello sviluppo dell'istruzione scolastica moderna.

(PT) CONCLUSÃO

As tecnologias digitais modernas colocam novos desafios à educação escolar. Exigem uma mudança na organização e condução do processo de aprendizagem e a alteração do papel dos professores - de mentores e palestrantes a moderadores e facilitadores da aprendizagem.

As tecnologias de IA têm o potencial para modificar abordagens tradicionais, métodos e tecnologias de ensino e aprendizagem. As aplicações de IA já estão a ser utilizadas em certa medida em vários aspetos da educação escolar, incluindo o estabelecimento e análise dos resultados de aprendizagem, a personalização de recursos educacionais e do processo de aprendizagem, na disponibilização de feedback imediato e no envolvimento dos estudantes.

A implementação e utilização de sistemas de serviços e ferramentas de aprendizagem inteligente, oferecem grandes oportunidades para aumentar o conhecimento dos estudantes, desenvolver competências-chave e apoiar os professores na organização da aprendizagem personalizada. Desta forma, os professores podem concentrar-se em atividades mais importantes, como o planeamento das aulas e o apoio aos estudantes, enquanto utilizam sistemas automatizados de avaliação e feedback.

Apesar destas vantagens, a utilização de IA na educação (IAEd) também suscita importantes questões e problemas éticos. Estes problemas estão em grande parte relacionados com o agravamento das desigualdades existentes no sistema educativo, uma vez que os algoritmos de IA tendem a perpetuar preconceitos e distorcer informações incorporadas em algoritmos de aprendizagem automática. Além disso, para que os professores utilizem eficazmente a IA nas suas práticas de ensino, precisam de formação adequada e apoio.

Este documento apresenta uma abordagem para a organização de um curso de qualificação para formação de professores e facilitadores em Inteligência Artificial. Descreve o processo de definição das competências digitais necessárias que todos os participantes no processo de aprendizagem devem possuir; são apresentados materiais de estudo adicionais em módulos e tópicos separados; é definido o currículo do curso e são partilhados os resultados do curso de formação C2 realizado pelo consórcio do projeto em Atenas no verão de 2023.

Este e-book destina-se a todos os professores e facilitadores que desejam adquirir conhecimentos, competências e competências para ensinar e utilizar tecnologias de IA com estudantes dos 7º ao 12º ano do ensino secundário. Pode também ser utilizado por pessoas e instituições oficiais em países europeus responsáveis pelo desenvolvimento da educação escolar moderna.

(RO) CONCLUZII

Tehnologiile digitale moderne reprezintă noi provocări pentru educația școlară. Acestea necesită o schimbare în organizarea și desfășurarea procesului de învățare și schimbarea rolului profesorilor - de la mentori și lectori la moderatori și coordonatori ai procesului învățării.

Tehnologiile IA au potențialul de îmbunătăți abordările, metodele și tehnologiile tradiționale de predare și învățare. Aplicațiile IA sunt deja utilizate într-o anumită măsură în diferite aspecte ale educației școlare, inclusiv stabilirea și analizarea rezultatelor învățării, personalizarea resurselor educaționale și a procesului de învățare, furnizarea de feedback imediat și implicarea elevilor.

Implementarea și utilizarea sistemelor, serviciilor și instrumentelor inteligente de învățare oferă oportunități excelente de dezvoltare a cunoștințelor elevilor, de construire a competențelor cheie și de suport pentru profesori în organizarea predării personalizate. Astfel, profesorii se pot concentra pe activități mai importante, cum ar fi planificarea lecțiilor și sprijinul elevilor, utilizând în același timp sisteme automate de notare și feedback.

În ciuda acestor avantaje, utilizarea IA în educație (AIEd) ridică, de asemenea, întrebări și probleme etice importante. Aceste probleme sunt în mare măsură legate de exacerbarea inegalităților existente în sistemul educațional, deoarece algoritmii IA tind adesea să mențină prejudecățile și să distorsioneze informațiile încorporate în algoritmii de învățare automată. În plus, pentru ca profesorii să utilizeze în mod eficient IA în practicile lor de predare, aceștia au nevoie de formare și sprijin adecvate.

Acest document prezintă o abordare a organizării unui curs de calificare pentru formarea profesorilor și coordonatorilor în domeniul inteligenței artificiale. Prezintă procesul de definire a competențelor digitale necesare pe care trebuie să le dețină toți participanții la procesul de învățare; materiale suplimentare de studiu sunt prezentate pe module și teme separate; curriculum-ul cursului este definit și rezultatele cursului de formare C2 organizat de consorțiul proiectului la Atena în vara anului 2023 sunt prezentate în acest material.

Această carte electronică este destinată tuturor profesorilor și coordonatorilor care doresc să dobândească cunoștințe, abilități și competențe pentru predarea și utilizarea tehnologiilor IA la elevii din clasele 7-12 ale școlii gimnaziale. Acesta poate fi, de asemenea, utilizat de persoane și instituții oficiale din țările europene care sunt responsabile pentru dezvoltarea învățământului școlar modern.

(BG) ЗАКЛЮЧЕНИЕ

Съвременните цифрови технологии поставят нови предизвикателства пред училищното образование. Те изискват промяна в организацията и провеждането на учебния процес и промяна на ролята на учителите - от ментори и преподаватели до модератори и фасилитатори на ученето.

Технологиите за изкуствен интелект имат потенциала да променят и модифицират традиционните подходи, методи и технологии за преподаване и учене. ИИ приложенията вече се използват до известна степен в различни аспекти на училищното образование, включително установяване и анализ на резултатите от обучението, персонализиране на образователните ресурси и учебния процес, предоставяне на незабавна обратна връзка и ангажиране на учениците.

Внедряването и използването на интелигентни учебни системи, услуги и инструменти предлагат големи възможности за повишаване на знанията на учениците, изграждане на ключови компетентности и подпомагане на учителите в организирането на персонализирано обучение. По този начин учителите могат да се съсредоточат върху по-важни дейности като планиране на уроци и подкрепа на учениците, като същевременно използват автоматизирани системи за оценяване и обратна връзка.

Въпреки тези предимства, използването на ИИ в образованието (AIEd) също повдига важни етични въпроси и въпроси. Тези проблеми до голяма степен са свързани с изострянето на съществуващите неравенства в образователната система, тъй като алгоритмите на ИИ често са склонни да подкрепят пристрастия и да изкривяват информацията, вградена в алгоритмите за машинно обучение. Освен това, за да могат учителите ефективно да използват изкуствен интелект в своите преподавателски практики, те се нуждаят от подходящо обучение и подкрепа.

Настоящият документ представя един подход за организиране на квалификационен курс за обучение на учители и фасилитатори по изкуствен интелект. Представя процеса за дефиниране на необходимите дигитални компетентности, които всички участници в учебния процес трябва да притежават; представени са допълнителни учебни материали по отделни модули и теми; определя се учебната програма на курса и се споделят резултатите от обучителния курс C2, проведен от консорциума по проекта в Атина през лятото на 2023 г.

Тази електронна книга е предназначена за всички учители и фасилитатори, които желаят да придобият знания, умения и компетентности за преподаване и използване на ИИ технологии с ученици от 7 до 12 клас на средното училище. Може да се използва и от хора и официални институции в европейските страни, които са отговорни за развитието на съвременното училищно образование.

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ANNEX 1: FACILITATE-AI COMPETENCIES FRAMEWORK

FACILITATE-AI

Co-funded by the European Union

Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

FACILITATE-AI COMPETENCE FRAMEWORK (Student)

*The FRAMEWORK with **5 Competences Areas** (excluding Teachers' competences)*

Area A: Learning	low … … … high
A1. Actively engaging in Learning	☐ ☐ ☐ ☐ ☐
A2. Creatively using & interacting with digital technology	☐ ☐ ☐ ☐ ☐
A3. Acquiring specific achievements	☐ ☐ ☐ ☐ ☐
A4. Eliminating disadvantages	☐ ☐ ☐ ☐ ☐
Area B: Information & Digital Resources	low … … … high
B1. Exploring & evaluating information and digital content	☐ ☐ ☐ ☐ ☐
B2. Critical navigation	☐ ☐ ☐ ☐ ☐
B3. Processing data and digital content	☐ ☐ ☐ ☐ ☐
B4. Developing digital content	☐ ☐ ☐ ☐ ☐
B5. Managing data and digital content	☐ ☐ ☐ ☐ ☐
B6. Applying algorithms	☐ ☐ ☐ ☐ ☐
Area C: Communication & Collaboration	low … … … high
C1. Actively engaging in communication	☐ ☐ ☐ ☐ ☐
C2. Actively engaging in collaboration	☐ ☐ ☐ ☐ ☐
C3. Interacting through digital technologies	☐ ☐ ☐ ☐ ☐
C4. Collaborating through digital technologies	☐ ☐ ☐ ☐ ☐
C5. Communicating computational thinking	☐ ☐ ☐ ☐ ☐
C6. Communicating technology responsively	☐ ☐ ☐ ☐ ☐
C7. Sharing through digital technologies	☐ ☐ ☐ ☐ ☐
Area D: Creation & Innovation	low … … … high
D1. Actively enabling in creation	☐ ☐ ☐ ☐ ☐

D2. reatively using digital technology	☐ ☐ ☐ ☐ ☐
D3. Adapting technology to create knowledge	☐ ☐ ☐ ☐ ☐
D4. Proposing creative solutions to problems	☐ ☐ ☐ ☐ ☐
D5. Creating content responsively	☐ ☐ ☐ ☐ ☐
D6. Representation and reasoning	☐ ☐ ☐ ☐ ☐

Area E: Emotion & Ethics	low … … … high
E1. Awareness of machine ethics	☐ ☐ ☐ ☐ ☐
E2. Protecting privacy	☐ ☐ ☐ ☐ ☐
E3. Respecting safety and well-being	☐ ☐ ☐ ☐ ☐

ANNEX 2: TEMPLATE FOR ADDITIONAL LEARNING RESOURCE

Additional resources. Presentations, interactive resources, sample tasks and practical exercises	
Title	Programming in Prolog
Reference Module and topic	C1 Module 3. AI Fundamentals
Partner	Plovdiv University
Abstract	The logic programming language Prolog is the basis for creating decision-making systems based on inputted facts and rules. The clip demonstrates the use of this programming language in the context of knowledge about the ancient Greek gods and their family relationships.
Content	Video file of a Prolog programming example related to the family relationships of the ancient Greek gods.
Targeted digital competencies	Digital competences according to Digicomp Framework in R2.A1: • Integrating and re-elaborating digital content • Programming • Creatively using digital technology • Using different digital tools and technologies for problem solving
School Grades	7-9
Resource	files detailing the additional information presented (pdf, pptx, etc.) - Programming in Prolog - pdf and mp4 files
Links	https://drive.google.com/file/d/1xCGjNHPuRAgJKO-iQAY8wCnckMtAkYon/view?usp=share_link

ANNEX 3: TEMPLATE FOR MOTIVATION VIDEO FILE

Additional resources. Videos	
Title	Python and Application of A* Algorithm :
Reference Module and topic	Basics AI.
Abstract	An application on an algorithm for a solution Breadth First Search, Depth First Search, A-Star Search when solving a problem for a problem, it is necessary to enter the labyrinth. Algorithm to implement it in Python.
Targeted digital competencies	Digital competences according to Digicomp Framework in R1 and R2.A1 Evaluation data information and digital content Programming Creatively using digital technology Using different digital tools and technologies for problem solving Adopting new methods of teaching and learning Application of algorithms in solving real problems Increasing the effectiveness of teaching
School Grades	7-10
Duration (min)	2:08 min.
Link	https://youtu.be/iWemY6CRIR0
Partner	P1 Plovdiv University

ANNEX 4: LEARNING PLANS OF C2 MODULES

MODULE 1: Motivation, Creative Resources and Ethics in Education

FACILITATE-AI
GUIDELINES FOR FACILITATING THE LEARNING OF ARTIFICIAL INTELLIGENCE BY SCHOOL STUDENTS OF GRADES 7-12

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Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3
Module Number and Area/Topic: Motivation-Resources-Ethics
Module owners: Doukas School, Ivan Apostolov, UCY

Introduction and Broad Description of the Context and Goal of the area/topic addressed

This module focuses on integrating artificial intelligence (AI) into education. The goal is to provide educators with the knowledge and skills to effectively use AI in teaching and learning. Educators will explore practical applications of AI in education, learn fundamental AI concepts and tools, and enhance motivation and engagement using digital game elements. They will also develop digital literacy and skills for utilizing digital data and resources in an AI environment.

Educators will adapt their teaching methods and content to introduce and teach AI concepts to students, promoting critical thinking and problem-solving. They will gain an awareness of AI's potential transformation in education, including personalized approaches and data analysis. Ethical considerations and biases in AI development will be explored, emphasizing the importance of transparency and responsible use of AI.

Educators will gain practical knowledge in building AI models and understand the impact of AI on society. The overall goal is to foster an understanding of AI's potential in education, develop AI ethics, and prepare educators to navigate the AI-driven future while empowering their students for success in the digital age.

Learning objectives and **learning outcomes**

1. Describe practical applications of AI in various real-world contexts, including education.
2. Identify the fundamental AI concepts, algorithms, and tools.
3. Enhance motivation and engagement through the use of digital game elements in teaching AI.
4. Enhance digital literacy and skills for utilizing existing digital data and resources in an AI environment.
5. Adapt teaching methods and content to effectively introduce and teach AI concepts to students.
6. Cultivate an awareness of AI's potential transformation in teaching and learning practices.

7. Explore AI's potential for enhancing teaching and learning experiences through personalized approaches and data analysis.
8. Gain practical knowledge and skills in building AI models, including training, validation, and testing.
9. Promote critical thinking and problem-solving abilities through AI-based real problems.
10. Explore the ethical considerations and potential biases in AI development and implementation.
11. Develop an attitude of AI ethics and the importance of transparency in AI systems.
12. Foster the AI's impact on society and everyday life, including ethical considerations.

Competences

- Adapting accessibility and inclusion
- Adapting differentiation and personalisation
- Adopting new methods of teaching and learning
- Creatively using digital technology
- Enhancing the effectiveness of teaching
- Interacting through digital technologies
- Enhancing the activities for learning
- Exploring information and digital content
- Interacting through digital technologies
- Actively engaging learners
- Collaborating through digital technologies
- Adapting technology to create knowledge
- Awareness of digital division and exclusion
- Awareness of guidelines for ethical systems

Instruments/Tools/Supporting Material/Resources to be used:

- *Teachable Machine Train* a computer to recognize your own images, sounds, & poses. A fast, easy way to create machine learning models for your sites, apps, and more – no expertise or coding required. https://teachablemachine.withgoogle.com/
- *Which face is Real*: Guess if the face is real or AI generated. https://www.whichfaceisreal.com/
- *AutoDraw* pairs machine learning with drawings from talented artists to help everyone create anything fast. https://www.autodraw.com/
- *Animated Drawings*: Bring children's drawings to life, by animating characters to move around. https://sketch.metademolab.com/
- *Gencraft*: Describe your creation in detail. https://gencraft.com/generate
- *Shadow Art*: Try your hands at the art of shadow puppetry, with a little help from AI. https://shadowart.withgoogle.com/?lang=en-us
- *Google Lens:* Point your camera at something, and Google Lens tells you what it is. https://lens.google/intl/en/
- *Pl@ntNet*: a tool to help to identify plants with pictures. https://identify.plantnet.org/
- *Bird Sounds*: Thousands of bird sounds visualized using machine learning. https://experiments.withgoogle.com/ai/bird-sounds/view/
- Use the *Photomath* app to scan a tricky problem. Get instant solution steps for your exact problem, vetted by a team of math teachers. Use those steps to dig into the nitty-gritty and learn at your own pace. https://photomath.com/en/
- *WolframAlpha*: Compute expert-level answers using Wolfram's breakthrough algorithms, knowledgebase, and AI technology. https://www.wolframalpha.com/

PART 1	
Learning Objectives	1. Describe practical applications of AI in various real-world contexts, including education. 2. Identify of the fundamental AI concepts, algorithms, and tools. 3. Adapt teaching methods and content to effectively introduce and teach AI concepts to students. 4. Cultivate an awareness of AI's potential transformation in teaching and learning practices. 5. Explore AI's potential for enhancing teaching and learning experiences through personalized approaches and data analysis.
Learning Outcomes	1. Understand the practical applications of AI in various real-world contexts, including education. 2. Demonstrate knowledge of fundamental AI concepts, algorithms, and tools. 3. Incorporate digital game elements effectively to enhance motivation and engagement in teaching AI. 4. Adapt teaching methods and content to effectively introduce and teach AI concepts to students. 5. Recognize and evaluate the potential transformation of teaching and learning practices through AI.
Competences	● Adopting new methods of teaching and learning ● Creatively using digital technology ● Enhancing the effectiveness of teaching ● Enhancing the activities for learning ● Exploring information and digital content ● Interacting through digital technologies ● Actively engaging learners
Activities	● What is Intelligent? ● What is AI (Activity) ● Definitions of AI (Bibliography) ● Data-Driven AI vs Knowledge-based or Symbolic AI or Rule-based AI ● Generative AI ● Generative AI (Activity) ● Generative AI Application Landscape ● Generative AI (LLMs and LDMs) Infographics and Visualisations ● Challenging Research Questions about AI ● Facilitate-AI R1 AI Teaching Guide for Teachers

PART 2	
Learning Objectives	● Enhance motivation and engagement through the use of digital game elements in teaching AI. ● Enhance digital literacy and skills for utilizing existing digital data and resources in an AI environment. ● Adapt teaching methods and content to effectively introduce and teach AI concepts to students. ● Cultivate an awareness of AI's potential transformation in teaching and learning practices.

	• Explore AI's potential for enhancing teaching and learning experiences through personalized approaches and data analysis. • Gain practical knowledge and skills in building AI models, including training, validation, and testing. • Promote critical thinking and problem-solving abilities through AI-based real problems.
Learning Outcomes	• Utilize digital data and resources proficiently within an AI environment to enhance digital literacy and skills. • Adapt teaching methods and content to effectively introduce and teach AI concepts to students. • Recognize and evaluate the potential transformation of teaching and learning practices through AI. • Apply AI to personalize teaching and learning experiences and analyze data for insights. • Develop practical knowledge and skills in building AI models, including training, validation, and testing. • Foster critical thinking and problem-solving abilities through AI-based real-world problems.
Competences	• Adapting accessibility and inclusion • Adapting differentiation and personalisation • Adopting new methods of teaching and learning • Creatively using digital technology • Enhancing the effectiveness of teaching • Interacting through digital technologies • Enhancing the activities for learning • Exploring information and digital content • Interacting through digital technologies • Actively engaging learners
Activities	• Why introduce AI in Secondary Education, with what objectives? • How can AI be integrated into education and be implemented in the classroom? • Conceptualizing AI Literacy • Data and AI Literacy • Competences Framework for Teachers • Competences Framework for Students

References & Videos

- ChatGPT and Artificial Intelligence in higher education Quick start guide: https://www.iesalc.unesco.org/wp-content/uploads/2023/04/ChatGPT-and-Artificial-Intelligence-in-higher-education-Quick-Start-guide_EN_FINAL.pdf
- What is the DQ Framework? Global Standards for Digital Literacy, Skills, and Readiness (DQ): https://live.dqinstitute.org/dq-framework/
- Digital Education: Educational Data Analytics & Artificial Intelligence: https://talos-ai4ssh.uoc.gr/wp-content/uploads/2023/05/01.SampsonTALOS2023.pdf
- State of the art and practice in AI in education: https://www.researchgate.net/publication/364994764_State_of_the_art_and_practice_in_AI_in_education

- Computers and Education: Artificial Intelligence: https://www.sciencedirect.com/journal/computers-and-education-artificial-intelligence
- The ethical use of AI and data in teaching and learning for Educators: https://talos-ai4ssh.uoc.gr/wp-content/uploads/2023/05/03.Gkountouma@TALOS2023.pdf
- Generative AI Tools in the Creative Domains: The Power and Pressure Game Is On: https://www.rapidops.com/blog/generative-ai-tools/
- Facilitate-AI R1 AI Teaching Guide for Teachers: https://facilitate-ai.eu/wp-content/uploads/2023/03/R1-AI-Teaching-Guide-for-teachers-facilitating-the-learning-of-students-in-grades-7-12_Final.pdf
- Artificial Intelligence and the Future of Teaching and Learning Insights and Recommendations: https://www2.ed.gov/documents/ai-report/ai-report.pdf

Videos:

- The Top 5 Ways to Use AI in Education: https://www.youtube.com/watch?v=nhI5g2hRVKA&ab_channel=AnalyticsInsight
- How AI Could Save (Not Destroy) Education | Sal Khan | TED: https://www.youtube.com/watch?v=hJP5GqnTrNo&ab_channel=TED
- Google Duplex: A.I. Assistant Calls Local Businesses to Make Appointments: https://www.youtube.com/watch?v=D5VN56jQMWM&t=181s&ab_channel=JeffGrubb%27sGameMess
- What is a digital assistant: https://www.youtube.com/watch?v=dqmJRScuZnE&ab_channel=SwissRe
- How AI works in everyday life | Google AI: https://www.youtube.com/watch?v=oJC8VIDSx_Q&ab_channel=Google
- DALL·E 2 Explained: https://www.youtube.com/watch?v=qTgPSKKjfVg&ab_channel=OpenAI
- AI Ethics Awareness Video: https://www.youtube.com/watch?v=hM9ziCAHI1o&ab_channel=SingaporeComputerSociety
- Artificial Intelligence: The Ethical and Legal Debate: https://www.youtube.com/watch?v=5pM6NFb4tqU&ab_channel=EuropeanParliament
- What is an Ethical Artificial Intelligence? Mozilla Explains: https://www.youtube.com/watch?v=xoue4-ohk1Y&ab_channel=Mozilla
- 7 Ethical Issues with AI That YOU Should Know About: https://www.youtube.com/watch?v=KyB7NSWEODE&ab_channel=ArunaPattam
- Trustworthy AI: Overview of the 7 requirements for Trustworthy AI: https://www.youtube.com/watch?v=v1qbym61atI&t=46s&ab_channel=TrustworthyAIProject
- Innovation and Best Teaching Practices Day: https://www.youtube.com/watch?v=C7dFjcU6eHk&t=8715s&ab_channel=DoukasSchool
- Introduction to Generative AI: https://www.youtube.com/watch?v=G2fqAlgmoPo&t=673s&ab_channel=GoogleCloudTech

Simple and Quick Activities

- **Teachable Machine Train** a computer to recognize your own images, sounds, & poses. A fast, easy way to create machine learning models for your sites, apps, and more – no expertise or coding required.https://teachablemachine.withgoogle.com/

- **Which face is Real**: Guess if the face is real or AI generated.https://www.whichfaceisreal.com/
- **AutoDraw** pairs machine learning with drawings from talented artists to help everyone create anything fast.https://www.autodraw.com/
- **Animated Drawings**: Bring children's drawings to life, by animating characters to move around. https://sketch.metademolab.com/
- **Gencraft**: Describe your creation in detail.https://gencraft.com/generate
- **Shadow Art**: Try your hands at the art of shadow puppetry, with a little help from AI.https://shadowart.withgoogle.com/?lang=en-us
- **Google Lens** Point your camera at something, and Google Lens tells you what it is. https://lens.google/intl/en/
- **Pl@ntNet**: a tool to help to identify plants with pictures. https://identify.plantnet.org/
- **Bird Sounds**: Thousands of bird sounds visualized using machine learning. https://experiments.withgoogle.com/ai/bird-sounds/view/
- Use the **Photomath** app to scan a tricky problem. Get instant solution steps for your exact problem, vetted by a team of math teachers. Use those steps to dig into the nitty-gritty and learn at your own pace. https://photomath.com/en/
- **WolframAlpha**: Compute expert-level answers using Wolfram's breakthrough algorithms, knowledgebase, and AI technology. https://www.wolframalpha.com/

Co-funded by the European Union

Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course: **Facilitate-AI OER Online Platform**

Result 2 – A3
Module Number and Area/Topic: **Module 2: Facilitate-AI OER Online Platform**
Module owners: Ivan Apostolov, Bulgaria

Introduction and Broad Description of the Context and Goal of the area/topic addressed
This module aims to help teachers introduce Facilitate-AI Online Platform as a tool mainly for schoolteachers to support a dynamic and adaptive STEAME Curriculum in their schools. The content is updated and growing continuously, so all teachers in Europe and beyond can stay informed, but also to publish their own work and material.

Learning objectives and **learning outcomes**

- To create and modify learning content related to knowledge representation and use relevant examples and real-life situations.
- To organize and share learning resources
- To evaluate digital resources related to teaching and to interact through various digital technologies
- To share data, information and digital content with other participants in the learning process
- To use digital tools and technologies for collaborative learning processes and to co-create new data, resources and knowledge

Competences

- Evaluation of data information and digital content
- Managing data information and digital content
- Integrating and re-elaborating digital content
- Enhancing the effectiveness of teaching
- Enhancing the activities for learning
- Exploring information and digital content
- Interacting through digital technologies
- Actively engaging learners
- Collaborating through digital technologies
- Actively engaging in communication
- Actively engaging in collaboration
- Exploring information and digital content
- Developing digital content

- Creatively using digital technology
- Using different digital tools and technologies for problem solving
- Active engagement of learners
- Adopting new methods of teaching and learning
- Increasing the effectiveness of teaching

Instruments/Tools/Supporting Material/Resources to be used:

- Facilitate-AI Online Platform, https://oer.facilitate-ai-portal.eu/
- PowerPoint Presentation

PART 1. Overview of the OER Facilitate AI platform	
Learning Objectives	Get introduced with Facilitate-AI Online Platform.
Learning Outcomes	Create personal account and get acknowledged with the Platform's architecture and content
Competences	• Evaluation of data information and digital content • Exploring information and digital content • Managing data information and digital content • Integrating and re-elaborating digital content
Activities	• Personal account creation • Exploring the platform

PART 2. Detailed overview of the OER Facilitate AI platform's features and structure	
Learning Objectives	Based on the Learning Outcomes of Part 1, to create, upload and share own materials. Engage in collaboration with other participants/users of the Platform.
Learning Outcomes	• To create and modify learning content related to knowledge representation, use relevant examples. • To evaluate digital resources related to teaching and to interact through various digital technologies • To use digital tools and technologies for collaborative learning processes and to co-create new data, resources and knowledge
Competences	• Using different digital tools and technologies for problem solving • Active engagement of learners • Adopting new methods of teaching and learning • Increasing the effectiveness of teaching • Actively engaging in communication • Actively engaging in collaboration • Developing digital content • Creatively using digital technology
Activities	• Create, upload and share own materials • Engage in communication • Engage in collaboration

FACILITATE-AI
GUIDELINES FOR FACILITATING THE LEARNING OF ARTIFICIAL INTELLIGENCE BY SCHOOL STUDENTS OF GRADES 7-12

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Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3
Module Number and Area/Topic: Module 3 - Solving problems of movement, speed, organization of our movement within the city with the use of AI tools
Module owners: CyMS

Introduction and Broad Description of the Context and Goal of the area/topic addressed

Solving problems in mathematics and physics can be a very boring process for students. Solving problems in their real lives can be much more interesting, but sometimes it can be a very difficult process. An approach that links and combines the two with the use of some AI tools that are already available on their mobile phones, perhaps better pique students' interest. The combination of teaching between subjects such as mathematics, physics, history, computer science to approach a real need of our daily lives, seems to be now necessary.

Learning objectives and learning outcomes

- to evaluate, select, and use appropriate digital tools and technologies to represent capabilities and basic AI algorithms for planning, decision making, problem solving and learning
- to apply different digital tools and technologies to define problem and select appropriate way for problem solving
- to evaluate different digital tools and technologies that can be used to create knowledge and to innovate processes and products.
- to adapt appropriately various digital tools and technologies for knowledge formation in the learning process.
- to select, identify and evaluate appropriate learning games for teaching and learning
- to organize and share the learning resources
- to evaluate digital resources, connected with teaching through games.
- to select games developed using various AI-technologies and algorithms
- to interact through a variety of digital technologies
- to understand appropriate digital communication means for a given context.
- to share data, information and digital content with other participants in the learning process through appropriate digital technologies.
- to use digital tools and technologies for collaborative learning processes, and for co-creation of new data, resources and knowledge.

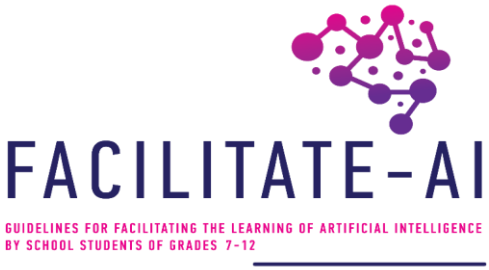
Competences

3.3.1. Creatively using digital technology
3.3.2. Using different digital tools and technologies for problem solving
4.1.1. Selecting, organizing and sharing of data
4.1.2. Evaluating information and digital content
4.2.1. Interacting through digital technologies
4.2.2. Sharing through digital technologies
4.2.3. Collaborating through digital technologies

Instruments/Tools/Supporting Material/Resources to be used:

PART 1	
Learning Objectives	Presentation of Learning and Creativity Plan with title "**Solving problems of movement, speed, organization of our movement within the city with the use of AI tools".** Through this presentation, trainees will be guided on ways they can approach the teaching of the following: Calculate and solve problems of time, speed, shorter route, more economical route, more reliable route for planning in advance, etc Information, acquaintance with the important points of the city from a historical, cultural, social, and political point of view Use of AI tools to plan routes or make real-time trips
Learning Outcomes	Information about ways to approach the teaching of the above in a creative and interdisciplinary way and with the use and assistance of AI Tools.
Competences	3.3.1. Creatively using digital technology 3.3.2. Using different digital tools and technologies for problem solving 4.1.1. Selecting, organizing and sharing of data 4.1.2. Evaluating information and digital content 4.2.1. Interacting through digital technologies 4.2.2. Sharing through digital technologies 4.2.3. Collaborating through digital technologies
Activities	Introducing new AI Tools such as: SmartGuide

PART 2	
Learning Objectives	Creation of an automated Power Point Presentation from a word file.
Learning Outcomes	Transform and prepare a word file in a way that can be converted to a professional Power Point Presentation
Competences	4.2.2. Sharing through digital technologies
Activities	Transform and prepare a Learning and Creativity Plan in a word version, to a professional Power Point Presentation



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Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3
Module Number and Area/Topic: Module 3. 2. Prolog in the service of AI (Applications, e.g. family relationship)
Module owners: Plovdiv University, Bulgaria

Introduction and Broad Description of the Context and Goal of the area/topic addressed

This module aims to help teachers introduce the basic concepts, methods and techniques of classical and modern artificial intelligence, and in particular the ways of representing and processing semantic information, as well as the capabilities of Python and the logic programming language Prolog. To consider an application of semantic information processing and logic programming to describe and draw logical conclusions in the field of family relationships.

Learning objectives and learning outcomes

- To create and modify learning content related to knowledge representation, logic programming and use relevant examples and real-life situations.
- To organize and share learning resources
- To evaluate digital resources related to teaching and to interact through various digital technologies
- To share data, information and digital content with other participants in the learning process
- To use digital tools and technologies for collaborative learning processes and to co-create new data, resources and knowledge

Competences

- Evaluation data information and digital content
- Managing data information and digital content
- Integrating and re-elaborating digital content
- Programming
- Creatively using digital technology
- Using different digital tools and technologies for problem solving
- Active engagement of learners
- Adopting new methods of teaching and learning
- Increasing the effectiveness of teaching

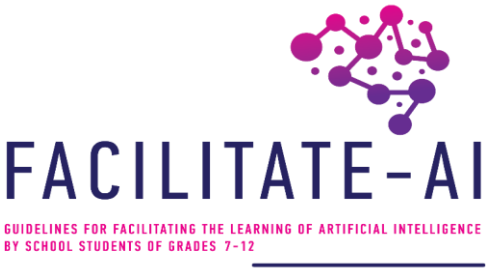
Instruments/Tools/Supporting Material/Resources to be used:

- SWI Prolog, https://www.swi-prolog.org/

PART 1. Logic Programming with Prolog	
Learning Objectives	Introducing the features of logic programming with Prolog.
Learning Outcomes	To create and modify learning content related to knowledge representation, logic programming and use relevant examples and real-life situations.
Competences	• Evaluation data information and digital content • Managing data information and digital content • Integrating and re-elaborating digital content • Programming
Activities	• Introducing the features of logic programming with Prolog - presentation

PART 2. Examination of the LCP on the topic "Prolog in the service of AI"	
Learning Objectives	To consider an application of semantic information processing and logic programming to describe and draw logical conclusions in the field of family relationships.
Learning Outcomes	• To create and modify learning content related to knowledge representation, logic programming and Python programming, use relevant examples and real-life situations. • To evaluate digital resources related to teaching and to interact through various digital technologies • To use digital tools and technologies for collaborative learning processes and to co-create new data, resources and knowledge
Competences	• Using different digital tools and technologies for problem solving • Active engagement of learners • Adopting new methods of teaching and learning • Application of algorithms in solving real problems • Increasing the effectiveness of teaching
Activities	• Presentation of LCP on the topic "Prolog in the service of AI (Applications, e.g. family relationship) • Presentation of study resources

PART 3. Discussion	
Learning Objectives	• To evaluate digital resources related to teaching and to interact through various digital technologies
Learning Outcomes	• To share data, information and digital content with other participants in the learning process • To use digital tools and technologies for collaborative learning processes and to co-create new data, resources and knowledge
Competences	• Adopting new methods of teaching and learning • Increasing the effectiveness of teaching
Activities	Discussion and evaluation



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Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3

Module Number and Area/Topic: Module 3.3 – Image Classification

Module owners: IPP

Introduction and Broad Description of the Context and Goal of the area/topic addressed

Students will learn about the creation of image classification algorithms based on techniques from machine learning and deep learning. Focusing on a practical approach, foundational understanding of machine learning is detailed followed by practical examples during the initial introduction. Later students are presented with advanced concept from image classification in a project-based and inquiry-based learning supported by teachers that guide students. It is expected that students will be able to structure of an image-based dataset, the data collection process and how a Machine Learning model can be trained, evaluated, and used to automatically classify images into categories using neural networks autonomously and, in a competition-based activity.

Learning objectives and **learning outcomes**

- To know and apply the concepts of image classification
- Understand how to train models, evaluate model and model productionizing.
- To train machine learning models based on image datasets into a known category.
- Critically evaluate and compare multiple machine learning models according to objective criteria
- Understand the impact of data collection and model configuration on the quality of ML models

Competences

- Applying algorithms
- Processing data and digital content
- Communicating computational thinking
- Creatively using digital technology
- Managing data and digital content
- Creatively using & interacting with digital technology
- Adapting technology to create knowledge
- Proposing creative solutions to problems

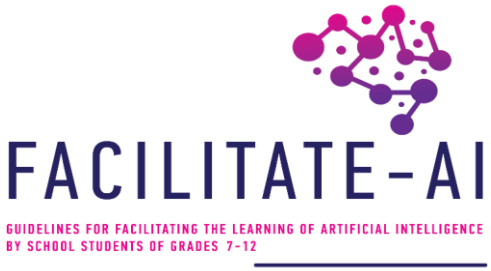
Instruments/Tools/Supporting Material/Resources to be used:

- Knime.zip – a folder containing a knime installation with all plugins installed and configured for the lesson plan
- Workflows.zip – collection of knime workflows to demonstrate the application of neural networks, image preparation and classification.
- FACILITATE-AI-Knime-Presentation – supporting presentation with different modules for each task in the learning plan

- Kaggle.pdf – Instruction on how to host a Kaggle competition with the provided dataset to classify images as zombies or non-zombie.
- Dataset.csv – a dataset which contains different game characters which contains zombies and non-zombies samples that can be used as a starting point, to train a model
- Images.zip – a collection of images in different categories to be trained by the deep learning mode

PART 1	
Learning Objectives	• Define the context of machine learning problems • Learn and characterize a machine learning problems. • Learn the structure of deep learning models for image classification.
Learning Outcomes	• Machine learning definitions • Knime workflow execution and basic understanding of the machine learning pipeline from data to model training and evaluation • Understand the impact of data collection and model configuration on the quality of ML models • Processing data and digital content
Competences	• Communicating computational thinking • Processing data and digital content • Communicating computational thinking
Activities	• Presentations of machine learning context and categorization of machine learning problems and workflows

PART 2	
Learning Objectives	• Understanding basic machine learning workflows • Creation machine learning workflows for image classification.
Learning Outcomes	• Development of machine learning workflows for image classification. • Understand the impact of data collection and model configuration on the quality of ML models • know and apply the concepts of image classification
Competences	• Applying algorithms • Processing data and digital content • Communicating computational thinking • Creatively using digital technology • Managing data and digital content • Creatively using & interacting with digital technology • Adapting technology to create knowledge • Proposing creative solutions to problems
Activities	• Development of machine learning workflows using knime • Model optimization and evaluation • Model generalization to new image classification problems • Machine Learning Competition using Kaggle



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Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3
Module Number and Area/Topic: 3.4. Pathway to Innovation AI
Module owners: Spiru Haret University, Romania

Introduction and Broad Description of the Context and Goal of the area/topic addressed

This workshop builds off prior activities involving choosing the most appropriate AI application for the task to be solved and for the filed

Solving different problems manifested in current life and professional activities by means of AI tools.

Learning objectives and **learning outcomes**
By the end of the L&C Plan, users should be able to know and complete the following:

- Understanding the need for innovation, its role in education, and for company/society level
- Acquisition of basic knowledge of innovation AI tools and practical implementations at the level of school/company;
- Knowledge of techniques and methods to stimulate creativity and innovation;
- Mastering the operation of innovation management by identifying leaders, innovative teams, and innovative networks;

Upon completion of this COURSE activity, users will be able to:

- Master its own creativity in an AI environment;
- Learning the steps to move from creativity to experiments and applied research
- Research, development, innovation
- Developing skills for conducting experiments
- Learn how to protect ideas and how to cooperate
- Entrepreneurial development, business acceleration & oriented education
- Innovation ecosystems and technology transfer
- Clusters and strategic alliances and applied, Development of StartUps
- Digital transformation base on AI

Competences

- Searching on the internet different AI tools and applications
- Choosing the appropriate AI tool/ app for the task to be solved
- Interacting and collaborating through AI technologies
- Reseach collaborating through AI technologies
- Awareness of risk associated with AI tools/apps
- Respecting safety and well-being

Instruments/Tools/Supporting Material/Resources to be used:

The best AI productivity tools by category:

- Open AI https://openai.com/
- Content creation (Copy.ai, Jasper, Surfer, Compose.ai, Dynos ~ Create & Share Engaging Digital Content),
- Text enhancement (Grammarly, Wordtune, Hemingway)
- Image generation (neural.love, Stable Diffusion, DALL·E 2, Illustroke), Image correction: InPaint https://theinpaint.com/
- Note-taking (Mem)
- Video creation (Fliki, Synthesia)
- Transcription (Otter)
- Slide decks and presentations (Beautiful.ai), Power Point generator https://app.presentations.ai/
- Research (genei)
- Automation (Zapier's OpenAI integration)
- Browsing Competition Activity (BowseAI)
- AI in Sports
  - 7 Game-Changing AI Applications (AI referee, AI personalized training and diet plans, AI Player Performance Monitoring, AI Scouting and Recruitment, Match predictions with AI, AI Ticket Sales, Automated sports journalism, Key concepts in the AI sports industry) https://www.v7labs.com/blog/ai-in-sports
  - BlockChain AI in sports Crypto sponsorships: eToro Tennis Sponsorship, Tokenizing for athletes keep aspiring: PlayerTokens, Smart tickets- Eventchain, SportsDataIO, Decentralization of Participation and Payments - No Limit Fantasy Sports, MyDFS, Fan Revenue Sharing - Socios, Sharing Information with Fans - Lympo

PART 1	
Learning Objectives	• Understanding the need for innovation, its role in education, and for company/society level • Acquisition of basic knowledge of innovative AI tools and practical implementations at the level of school/company;
Learning Outcomes	• Master its own creativity in an AI environment; • Learning the steps to move from creativity to experiments and applied research • Research, development, innovation • Developing skills for conducting experiments
Competences	• Searching on the internet for different AI tools and applications • Choosing the appropriate AI tool/ app for the task to be solved
Activities	**Warm up:** • Identifying different categories of AI tools/app • Creating an account, implementing the first test • Choosing the adequate tools • Learning how to use it in different taskes
PART 2	
Learning Objectives	• Knowledge of techniques and methods to stimulate creativity and innovation; • Mastering the operation of innovation management by identifying leaders, innovative teams, and innovative networks;
Learning Outcomes	• Learn how to protect ideas and how to cooperate • Entrepreneurial development, business acceleration & oriented education • Innovation ecosystems and technology transfer • Clusters and strategic alliances and applied, Development of StartUps • Digital transformation base on AI
Competences	• Interacting and collaborating through AI technologies • Reseach collaborating through AI technologies • Awareness of risk associated with AI tools/apps • Respecting safety and well-being
Activities	**Implement acquired knowledge** • Creating an account on a AI Learing Platform dedicated to personalised learning (eg. Prodigy Education or Edpp) • Accessing video- tutorials • Solving Assessmnets • Interact and design a project using AI tools and solving the problems within team

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Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3
Module Number and Area/Topic: Module 3.5 – AI in STEAME
Module owners: Ivan Apostolov

Introduction and Broad Description of the Context and Goal of the area/topic addressed

In the 21st century, we cannot have technology without including AI in it. As an extensively researched and developed area, STEAME education also needs to address artificial intelligence and how we can use it to our own advantage – responsibly of course. Hands-on learning is what really interests students, so a practical approach needs to be used whenever possible. The learning activities are focused on doing and understanding. Students first understand the concept of AI and then use their tech knowledge to present the applications of AI with code. They are divided into teams and tasked with figuring out different ways to use AI in Science, Business, Engineering and Art. The role of the teachers is crucial, as they are the facilitators of the whole learning process and need to understand a broad range of AI aspects.

Learning objectives and **learning outcomes**

- To **recognize** the different types of machine learning.
- To **relate** machine learning algorithms from games to real life problems.
- To **identify** problems that can be solved using AI.
- To **discuss** different ideas and concepts in AI freely.
- To **explain** the differences between the different types of machine learning.
- To **apply** basic machine learning knowledge in the creation of simple ML models.
- To **understand** the mathematics behind AI.
- To **analyze** scientific information properly.
- To **classify** data according to certain features.
- To **assess** students individually and as teams.
- To **create** simple ML models.
- To **estimate** whether a model is appropriate for a problem.
- To **experiment** with different models in solving a problem.
- To **track** the progress of students.

Competences

- Actively engaging in Learning
- Creatively using & interacting with digital technology
- Exploring & evaluating information and digital content

- Critical navigation
- Developing digital content
- Managing data and digital content
- Actively engaging in communication
- Actively engaging in collaboration
- Collaborating through digital technologies
- Communicating computational thinking
- Communicating technology responsively
- Sharing through digital technologies
- Actively enabling in creation
- Creatively using digital technology
- Adapting technology to create knowledge
- Proposing creative solutions to problems
- Awareness of machine ethics
- Selecting, organizing and sharing of data

Instruments/Tools/Supporting Material/Resources to be used:

- STEAME
- Learning with STEM
- MS PowerPoint – to create presentations for different STEAME areas
- Dall-E 2 – to create images using AI
- Google Colab – for presenting ML models easily
- MS Excel and Kaggle to examine different datasets
- E-learning platform
- Online communication platform – Google Meet, Discord, etc.

PART 1	
Learning Objectives	Presenting the **"STEAME in AI"** Learning and Creativity plan with a PowerPoint presentation. Trainees will understand: • What they need to prepare in order to execute the L&C Plan: work plan, AI information, assessment and self-assessment criteria, evaluation criteria • Some basic AI concepts • How to organize an ethics debate
Learning Outcomes	• Successfully implement the L&C plan in the classroom • Critically assess students' progress • Use the AI concepts properly • Link AI to STEAME
Competences	• Creatively using & interacting with digital technology • Critical navigation • Collaborating through digital technologies • Communicating computational thinking • Communicating technology responsively • Adapting technology to create knowledge
Activities	Various brainstorming challenges Introducing AI tools

PART 2	
Learning Objectives	Creation of a PowerPoint Presentation
Learning Outcomes	Create a PowerPoint presentation with tasks and examples for students
Competences	• Sharing through digital technologies • Managing data and digital content • Adapting technology to create knowledge • Selecting, organizing and sharing of data • Proposing creative solutions to problems
Activities	Creation of a PowerPoint Presentation

PART 3	
Learning Objectives	Create a set of rules for an AI ethics debate
Learning Outcomes	Set up the rules of the debate Set up the debate rubric Think of debate topics
Competences	• Actively engaging in communication • Actively engaging in collaboration • Proposing creative solutions to problems • Awareness of machine ethics • Selecting, organizing and sharing of data
Activities	Create a set of rules for an AI ethics debate

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Reference Number: 2021-1-CY01-KA220-SCH-000032567

C1 Training course: **Verification of training curriculum and developed learning materials**

Result 1 - A1/T1
Module Number and Area/Topic: Module 3.6 - Guess who?
Module owners: ITC- School

Introduction and Broad Description of the Context and Goal of the area/topic addressed

The intent of this module is to support teachers to implement PBL related to AI to help teachers who are not AI experts and students to understand what AI is and show some elements of how it works. Show how the human reasoning process that leads to making decisions, such as a "decision tree", is the basis of some AI applications, showing how tools that use AI are able to analyze and organize data and use these data to make predictions. This can lead to a transformation in the way of teaching and learning.

Learning objectives and **learning outcomes**
are described on the side of the descriptions of the different activities of this module:

1. To design, plan and implement the use of digital technologies in the different stages of the learning process
2. To use digital technologies to offer timely and targeted guidance and assistance
3. To use digital technologies to foster and enhance learner collaboration
4. To enable learners to use digital technologies as part of collaborative assignments, as a means of enhancing communication, collaboration and collaborative knowledge creation
5. To experiment with and develop new forms and formats for offering guidance and support
6. To use digital technologies to support learners' self- regulated learning i.e. to enable learners to plan, monitor and reflect on their own learning, providing evidence of progress, share insights and come up with creative solutions
7. To ensure accessibility to learning resources and activities, for all learners, including those with special needs.
8. To use digital technologies to address learners' diverse learning needs, by allowing learners to advance at different levels and speeds, and to follow individual learning pathways and objectives.
9. To use digital technologies to foster learners' active and creative engagement with a subject matter.
10. To use digital technologies within pedagogic strategies that foster learners' transversal skills, deep thinking and creative expression.

11. To open up learning to new, real-world contexts, which involve learners themselves in hands-on activities, scientific investigation or complex problem solving

Competences

1. Enhancing the effectiveness of teaching
2. Interacting through digital technologies
3. Collaborating through digital technologies
4. Self-regulated learning
5. Using assessment strategies
6. Providing feedback to learners
7. Adapting accessibility and inclusion
8. Adapting differentiation and personalisation
9. Actively engaging learners

Instruments/Tools/Supporting Material/Resources to be used:

1. https://cdn.iste.org/www-root/Libraries/Documents%20%26%20Files/Artificial%20Intelligence/AIGDEL_0820-red.pdf
2. www.PangeaFormazione.com
3. https://sliceofml.withgoogle.com/#/
4. https://it.akinator.mobi/
5. https://www.youtube.com/c/SefikIlkinSerengil/featured
6. https://sefiks.com/2018/08/27/a-step-by-step-cart-decision-tree-example/
7. http://elearning-let.unicas.it/home/wp-content/uploads/2018/03/Didattica-Lezione_03.pdf
8. https://blog.osservatori.net/it_it/intelligenza-artificiale-funzionamento-applicazioni
9. http://www.rivistabricks.it/2020/03/03/integrare-coding-e-pensiero-computazionale-nella-didattica/

PART 1 - Models of learning	
Learning Objectives	Understand the decision trees as on the basic tools of the AI aproces.
Learning Outcomes	• Understand that at the base of Artificial Intelligence there are algorithms, computational techniques, solutions, therefore able to replicate human behavior. • Identify the main classes of solutions.

PART 2	
Learning Objectives	"Create a Guessing Game" PBL project is illustrated as a practical example to: • Clarify the double role of AI in the pedagogic environment: topic to be learn and support for the activities • Highlight the main areas where AI and digital tools could support the learning process • Guide the students and teacher in getting the foundations of basic algorithms used in AI (e.g. decision tree) starting from a manual approach to a full developed tool
Learning Outcomes	• Illustrate a structural approach where the students are guided through a PBL project to develop an initial understanding of AI

	• Understand how the supporting role of the AI in the preparation and development of a project • Combine and harmonize the teacher competence development about AI topics at the same time as students
Competences	• To design, plan and implement the use of digital technologies in the different stages of the learning process • To use digital technologies to offer timely and targeted guidance and assistance • To use digital technologies to foster and enhance learner collaboration • To enable learners to use digital technologies as part of collaborative assignments, as a means of enhancing communication, collaboration and collaborative knowledge creation • To experiment with and develop new forms and formats for offering guidance and support • To use digital technologies to support learners' self- regulated learning i.e. to enable learners to plan, monitor and reflect on their own learning, providing evidence of progress, share insights and come up with creative solutions • To ensure accessibility to learning resources and activities, for all learners, including those with special needs. • To use digital technologies to address learners' diverse learning needs, by allowing learners to advance at different levels and speeds, and to follow individual learning pathways and objectives. • To use digital technologies to foster learners' active and creative engagement with a subject matter. • To use digital technologies within pedagogic strategies that foster learners' transversal skills, deep thinking and creative expression. • To open up learning to new, real-world contexts, which involve learners themselves in hands-on activities, scientific investigation or complex problem solving
Activities	• Project setup and pedagogical rationale • Project step by step activities and digital links

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Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3
Module Number and Area/Topic: 3.7 AI Profession Orientation Chatbot
Module owners: Eleni Adamidi (IASA), PPT

Introduction and Broad Description of the Context and Goal of the area/topic addressed

Career guidance in the era of fast changing employment world is crucial for today's young students. So far, only limited research has been conducted on using artificial intelligence to support guidance across primary and secondary education and professions. This L&C Plan will provide a guide to create an AI chatbot that will help students explore professions that they might be interested in, according to their hard and soft skills and their personality. In this way students will value the importance of using artificial intelligence to support career guidance in education and get familiarized with cognitive intelligence.

Learning objectives and **learning outcomes**

Upon completion of this L&C Plan, students will get familiarized with the AI methods used for chatbots and will develop their own example for profession orientation.
The outcomes will be:

- Understand basic AI methods used for chatbot development
- Develop a cognitive AI based chatbot
- Explore how specific soft skills are related to specific professions
- Self-reflect, communication skills enhancement

Competences

Handling basic functionalities of Microsoft Excel would be useful when building their own chatbot in the proposed platform. No programming knowledge is needed.

Instruments/Tools/Supporting Material/Resources to be used:

The teacher presents and demonstrates the needed resources though a projector. One computer per student group is the minimum requirement.

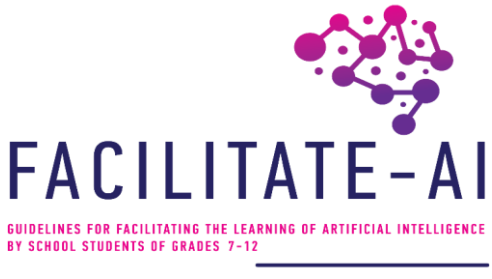
- The following tool can be used as an initial inspiration to experiment with what is considered the best AI chatbot today: https://openai.com/blog/chatgpt/
- Juji will be used to create AI chatbot without coding: https://juji.io/

- https://openai.com/blog/chatgpt/ A new cutting-edge AI chatbot that can be used as motivation for the purposes of this L&C Plan.
- https://eic.eismea.eu/challenges/solution/jobiri-1degai-based-digital-career-advisor/about This is the first AI based digital career advisor, Jobiri. It can be used as a first reference on what is available for profession orientation.
- Introduction to Large Language Models, Google, https://www.cloudskillsboost.google/course_templates/539

PART 1	
Learning Objectives	Intoduction to Machine Learnig (ML), Natural Language Processing (NLP), Deep Learning (DL), Artificial Neural Networks (ANNs)
Learning Outcomes	Students are introduced to chatbot, applications and Underlying Technology
Competences	Digital Competencies
Activities	**Activity 1**: Introduction to AI, ML, DL and their application today, performed by the teachers as described in STAGE I (60 min).

PART 2	
Learning Objectives	Familiarize with existing AI chatbots
Learning Outcomes	Hands-on experience with chat-GPT
Competences	Digital Competencies
Activities	**Activity 2**: T1 demonstrates existing AI-based chatbots to engage students and students experiment with OpenAI's new cutting edge ChatGPT chatbot. Teachers and students discuss how this chatbot works (40 min).

PART 3	
Learning Objectives	How chatbots are developed
Learning Outcomes	Chatbot for profession orientation
Competences	Digital Competencies
Activities	**Activity 3**: Students perform initial research on existing AI chatbots used for profession or career orientation (60 min). **Activity 4:** Students get familiar with the Juji platform, and the steps needed for developing a chatbot on their own. They form groups and assign roles for the design, development, and testing steps (60 min).



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C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3
Module Number and Area/Topic: 3.8. Digital Assistant in Class
Module owners: Doukas School

Introduction and Broad Description of the Context and Goal of the area/topic addressed

Digital Assistants (e.g. ChatGPT, Alexa, Siri, Google Assistant) have already been part of our everyday life so, we need to teach & learn our students the way to use them. Recently a break-through new tool – AI chatbot was presented and it was adopted by Education. Consequently, new educational scenarios were created, while accomplishing the objectives of efficient student learning. The learning plan is based on the collaboration of the Departments of Digital Education & Foreign Languages.

Learning objectives and **learning outcomes** *(from the short description: Competences List of the Training Modules)*

Learners understand the way digital assistants operate and process information according to the datasets of this AI environment

- Learners exploit new Vocabulary by getting familiar with AI and geographical features vocabulary
- Learners are introduced to a new grammar point, identifying the need of incorporating digital assistant in the learning process, getting with the specific grammar point: present tenses
- Learners improve knowledge of AI environment features in order to implement it throughout
- Learners should be able to successfully understand and apply the basic principles related to the use and exploitation of this environment
- Learners should be able to properly pronounce relevant vocabulary
- Learners should be able to ask the digital assistant and the get the right answer
- Learners should be able to use targeted grammatical structures meaningfully and appropriately in oral and written production.
- Learners should be able to distinguish between conventional and digital assisted lesson
- Learners should be able to work in teams and apply research methods to evaluate AI environment

Competences *(from the AI Competence Framework)*

- Exploring information and digital content
- Interacting through digital technologies
- Collaborating through digital technologies
- Awareness of digital division and exclusion
- Respecting safety and well-being

Instruments/Tools/Supporting Material/Resources to be used:

- **ChatGPT: OpenAI**
- **Alexa: Amazon - What is Alexa?**
- **Siri: Siri - Apple**
- **Google Assistant: Google Assistant, your own personal Google**

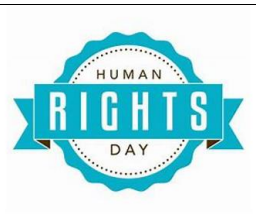
Other useful links:

- **climate.ec.europa.eu/climate-change/causes-climate-change_en**
- **climate.ec.europa.eu/climate-change/causes-climate-change_en#causes-for-rising-emissions**
- **www.un.org/en/climatechange/science/causes-effects-climate-change**
- **www.epa.gov/climatechange-science/causes-climate-change**

PART 1	
Learning Objectives	• Learners understand the way digital assistants operate and process information according to the datasets of this AI environment • Learners exploit new Vocabulary by getting familiar with AI and geographical features vocabulary
Learning Outcomes	• Learners should be able to successfully understand and apply the basic principles related to the use and exploitation of this environment • Learners should be able to ask the digital assistant and the get the right answer • Learners should be able to distinguish between conventional and digital assisted lesson
Competences	• Exploring information and digital content • Interacting through digital technologies
Activities	**Introduction Activity: Who is our new friend in Class today?** In this activity our goal is for students to install the DA and learn how to interact. **Activity 1: Today Alexa (or ChatGPT) will help us with Vocabulary!** The educator and the students ask DA and DA answers providing the suitable information (more details at the Worksheet “Activity 1”) The teacher starts with a warmup activity by asking the DA: What day is today? The answer <<Today is international day of persons with disabilities>> provides the basis for discussion

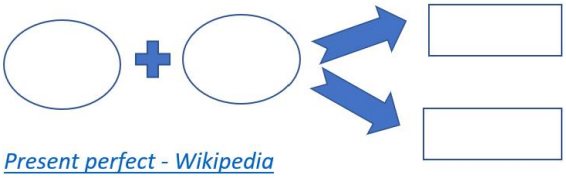
	We asked Alexa about: Cave _____ Cliff_____ Coast_____ Glacier_____ Ocean_____ Rainforest_____ Stream_____ Valley_____ *Discuss which geographical features in Exercise 1 you'd like to visit and why. You can use these questions:* • What activities can you do there? • What is the best type of clothing to wear? • What are some good things to bring with you? • Who would you like to visit the place with and why?

PART 2	
Learning Objectives	• Learners exploit new Vocabulary by getting familiar with AI and geographical features vocabulary • Learners are introduced to a new grammar point, identifying the need of incorporating digital assistant in the learning process, getting with the specific grammar point: present tenses
Learning Outcomes	• Learners should be able to properly pronounce relevant vocabulary • Learners should be able to use targeted grammatical structures meaningfully and appropriately in oral and written production.
Competences	• Exploring information and digital content • Interacting through digital technologies • Collaborating through digital technologies • Awareness of digital division and exclusion
Activities	The educator and the students ask DA and DA answers providing the suitable information (more details at the Worksheet “Activity 2”)



What is Present Perfect?

Present Perfect is a grammatical combination of the *present* tense and *perfect* aspect that is used to express a *past* event that has present *consequences* *(=results)*

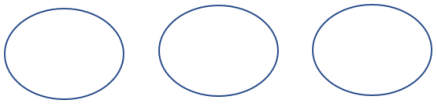


Present perfect - Wikipedia

How is Present Perfect formed?

Present perfect

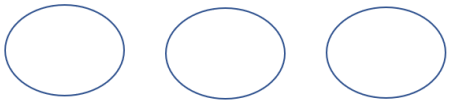
It is formed with the auxiliary (=helping) verb have and the third form of the main verb (past participle)



What is Present Perfect Continuous?

A tense that expresses an unbroken action continuing at the present time, started at the recent past.

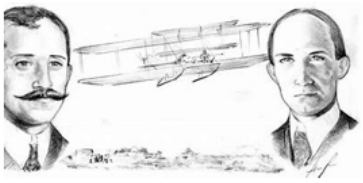
It is formed by using *have been* with *present particle*



What is the different between Present Perfect simple and Simple Past?

Activity 3: Today Alexa (or ChatGPT) will help us with climate change

The educator and the students ask DA and DA answers providing the suitable information (more details at the Worksheet “Activity 3”)

	What expression did you learn today? **The _____** **What day is today?**  **What is a shark?** 

PART 3	
Learning Objectives	• Learners understand the way digital assistants operate and process information according to the datasets of this AI environment • Learners exploit new Vocabulary by getting familiar with AI and geographical features vocabulary • Learners are introduced to a new grammar point, identifying the need of incorporating digital assistant in the learning process, getting with the specific grammar point: present tenses • Learners improve knowledge of AI environment features in order to implement it throughout • Learners understand the way digital assistants operate and process information according to the datasets of this AI environment • Learners improve knowledge of AI environment features in order to implement it throughout
Learning Outcomes	• Learners should be able to ask the digital assistant and the get the right answer

	• Learners should be able to distinguish between conventional and digital assisted lesson • Learners should be able to work in teams and apply research methods to evaluate AI environment
Competences	• Exploring information and digital content • Interacting through digital technologies • Collaborating through digital technologies • Respecting safety and well-being
Activities	**Activity 4: Studying a phenomenon with the help of a DA in order the students to produce an Infographic** The aim of the activity is to understand the issue of Climate Change, to exploit a phenomenon and produce an infographic as a result of the use of information given by an AI Digital Assistant (Alexa, Siri, Google Assistant etc.). The AI tool will give to the students all the necessary information. The educator should guide the students to move from the general to specific and keep only the data, which are useful for the construction of a successful Infographic. Here is an example for the phenomenon of Climate Change. The steps of the deployment interacting with a digital assistant in class are: A. Definition of the phenomenon: The student asks: *What is climate change?* *DA:* Presents information from one source (e.g. Wikipedia) B. Causes of the phenomenon Student asks: *Which are the causes of climate change?* *DA:* Presents information from one source (e.g. EPA United States Environmental Protection Agency) The students continue asking more questions and collect information in order to construct the Infographic. C. Specific & explanatory data 1. Green house gases 2. Fluorinated gases 3. Burning Coal 4. Increasing livestock farming 5. Fertilizers containing nitrogen D. Stakeholders statistics 1. UN data 2. Greenpeace 3. Scientific partners

FACILITATE-AI
GUIDELINES FOR FACILITATING THE LEARNING OF ARTIFICIAL INTELLIGENCE BY SCHOOL STUDENTS OF GRADES 7-12
Co-funded by the European Union

Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3
Module Number and Area/Topic: 3.9 Elements of AI Ethics
Module owners: Doukas, UCY

Introduction and Broad Description of the Context and Goal of the area/topic addressed

This workshop builds off prior activities involving research and finding sources to justify an argument. Individually and in small groups, students conduct research using search engines, videos, articles, generative applications and that expose ethical pitfalls in an Artificial Intelligence area of their choice.

Learning objectives and **learning outcomes**

Students will be able to:

- *define* artificial intelligence (AI) in their own words, using technologies they encounter in their daily lives as examples,
- *describe* at least one example of an ethical issue pertaining to AI, along with its impact on society,
- *recognize* that AI systems create profiles to predict what online information people will find interesting, from their public data,
- *identify* the advantages and disadvantages of the decisions people make in response to online information determined by machine learning algorithms.

Students should come into this lesson with prior knowledge and the skills to be able to (according to code.org activity):

- *recognize* credible sources on the internet,
- *summarize* information from digital sources to support an argument,
- *navigate* online resources and cite sources appropriately.

Competences

Exploring information and digital content

- Interacting through digital technologies
- Collaborating through digital technologies
- Awareness of digital division and exclusion
- Awareness of guidelines for ethical systems
- Protecting privacy
- Respecting safety and well-being

Instruments/Tools/Supporting Material/Resources to be used:

- Paddlet
- Which face is real?
- Teachable Machine
- Animated Drawings
- Ethics Guidelines for Trustworthy Artificial Intelligence
- ChatGPT
- Evaluation of Module 3.9: Elements of AI Ethics
- Anex of Module 3.9 Elements of AI Ethics

PART 1	
Learning Objectives	*Describe* at least one example of an ethical issue pertaining to AI, along with its impact on society
Learning Outcomes	*Summarize* information from digital sources to support an argument
Competences	Exploring information and digital content Awareness of guidelines for ethical systems
Activities	**Warm up:** - Vocabulary: Artificial Intelligence - the ability of machines to learn and problem-solve. - Ethics - guidelines for good behaviour. - Introductory Video: Ethics & AI: Equal Access and Algorithmic Bias - Discussion: What comes to mind when you hear the term artificial intelligence? What are examples of artificial intelligence you've seen either in real life or in fiction, like movies or music or television? Can you think of times when these examples were used for good and/or for bad, even if unintended? Are there things they do we might consider "right" or "wrong"?

PART 2	
Learning Objectives	• *define* artificial intelligence (AI) in their own words, using technologies they encounter in their daily lives as examples, • *describe* at least one example of an ethical issue pertaining to AI, along with its impact on society, • *recognize* that AI systems create profiles to predict what online information people will find interesting, from their public data, • *identify* the advantages and disadvantages of the decisions people make in response to online information determined by machine learning algorithms.
Learning Outcomes	• *recognize* credible sources on the internet, • *summarize* information from digital sources to support an argument, • *navigate* online resources and cite sources appropriately.
Competences	• Exploring information and digital content • Interacting through digital technologies • Collaborating through digital technologies • Awareness of digital division and exclusion • Awareness of guidelines for ethical systems • Protecting privacy • Respecting safety and well-being

Activities	**Activities:** 1) Students will build a data profile of themselves based on the types of data trails people frequently leave behind when they are online (for this action you can use "unplugged" approach with papers, or collaborative tool, such as online editors or boards, e.g. Padlet). 2) Each student participates in one of 5 groups of AI experts. Each of the groups specializes in a particular area of AI ethics. These 5 areas are digitally shared (see Annex). Explain that this document lists research in a different AI ethics area of specialization, along with sample articles and videos students may read and watch.

PART 3	
Learning Objectives	*define* artificial intelligence (AI) in their own words, using technologies they encounter in their daily lives as examples, *identify* the advantages and disadvantages of the decisions people make in response to online information determined by machine learning algorithms.
Learning Outcomes	*Summarize* information from digital sources to support an argument,
Competences	Awareness of digital division and exclusion Awareness of guidelines for ethical systems
Activities	**Conclusions and Evaluation:** 1. How would you describe "AI ethics" to a family member or friend who didn't participate in today's activities? 2. What are guidelines we can use to create ethical machine learning apps? 3. *Can AI systems develop an ethical behaviour in the same way that humans grow to be ethical?* Share examples of an AI code of ethics, such as those by Google Responsibility. • Were the learning objectives clear/align to you? • Did you feel motivated throughout the lesson? • What was your favourite activity or learning experience in this lesson? • Did the lesson provide opportunities for you to develop new competences? • What improvements or changes would you suggest for this lesson plan?

Co-funded by the European Union

FACILITATE-AI

GUIDELINES FOR FACILITATING THE LEARNING OF ARTIFICIAL INTELLIGENCE BY SCHOOL STUDENTS OF GRADES 7-12

Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course:**Verification of training curriculum and developed learning materials**

Result 2 – A3

Module Number and Area/Topic: Module 4: Practicum – Implementation by Trainees

Module owners: Facilitate-AI Consortium

Introduction and Broad Description of the Context and Goal of the area/topic addressed

In this Module, consortium members create distinct activities to equip high school teachers with effective tools for AI education. The goal is to engage students, foster real-world relevance, and encourage collaboration in AI learning.

Learning objectives and **learning outcomes**

The learning objectives and learning oucomes of the module include understanding AI concepts, designing effective activities, addressing teaching challenges, integrating hands-on experience, and promoting ethical considerations.

Competences

By taking this module, participants will gain a range of competencies that will enhance their capabilities as AI educators. These competencies include:

1. AI Knowledge: A comprehensive understanding of fundamental AI concepts, algorithms, and applications, empowering them to confidently teach AI topics to high school students.
2. Pedagogical Skills: The ability to design and implement engaging and effective teaching activities that cater to the diverse learning styles of students in grades 7 to 12.
3. Problem-Solving and Critical Thinking: The capacity to analyze challenges in AI education and devise innovative solutions to ensure successful knowledge transfer and student engagement.
4. Hands-on Experience: Practical skills in implementing real-world AI applications and guiding students through interactive activities that involve AI technologies.

5. Ethical Awareness: A heightened awareness of the ethical considerations surrounding AI and the capability to guide students in making responsible and ethical decisions when using AI.
6. Collaboration and Communication: The capacity to collaborate effectively with peers and educators, fostering a community of AI enthusiasts, and the ability to communicate complex AI concepts in a clear and accessible manner.
7. Adaptability: Flexibility in adapting teaching approaches to meet the specific needs of diverse student populations, ensuring an inclusive and engaging learning environment.

Instruments/Tools/Supporting Material/Resources to be used: PowerPoint Presentations

PART A	**IPDP - IASA**
Learning Objectives	1. Understanding Text-to-Image Generative Models 2. Awareness of Bias in AI Models 3. Ethical Considerations 4. Dataset Import and Model Creation 5. Model Exploration 6. Comparison of AI Models 7. Hands-on Computer Vision 8. Image Quality Review 9. Presentation Skills
Learning Outcomes	1. Knowledge of Generative Models 2. Critical Thinking 3. Ethical Awareness 4. Practical Data Science Skills 5. Decision Tree Understanding 6. Model Comparison 7. Computer Vision Proficiency 8. Image Selection Skills 9. Presentation Skills
Competences	1. AI Understanding 2. Critical Analysis 3. Ethical Awareness 4. Data Handling 5. AI Model Interpretation 6. Analytical Thinking 7. Computer Vision Application 8. Visual Presentation 9. Project Management 10. Presentation Skills

Activities	3 distinct activities are mentioned in the Presentation: ● Pixels from prompts ● Diabetes Auto-Diagnosis ● Presentations with 3D assets

PART B	**Spiru Haret University & Doukas School**
Learning Objectives	● AI Applications in Biology ● Effective Communication ● Impact Assessment ● AI-Driven Plant Identification ● Hands-on Experience ● Biodiversity Awareness ● Understanding Image Generation ● Creating AI-Powered Presentations ● Evaluating Learning Outcomes ● Data Analysis ● Feedback and Improvement
Learning Outcomes	● Knowledge of AI in Biology ● Video Presentation Skills ● Critical Thinking ● Plant Recognition Skills ● Practical AI Application ● Environmental Awareness ● Image Generation Techniques ● AI Integration in Art ● Presentation Skills ● Data Interpretation
Competences	● AI Awareness ● Communication Proficiency ● Analytical Thinking ● AI Application Skills ● Problem Solving ● AI Image Generation ● Innovation and Experimentation ● Art and Technology Integration ● Adaptability
Activities	5 distinct activities are mentioned in the Presentation: ● AI For Biology – AI Video Presentation ● Plant Recognition with AI Pl@ntNEt ● Image generation in Craiyons ● PPT generation with app.presentations.ai ● Kahoot evaluation

PART C	Ivan Apostolov School & CYMS
Learning Objectives	• Familiarity with AI Tools • Tool Analysis • Effective Presentation • Storytelling with AI • Comparison with Human Writing • AI Driven Assessment and Objective Evaluation • Role playing and Presentation • Comparative Analysis • Text-to-Image AI applications • Historical understanding • Crisis scenario creation
Learning Outcomes	1. Tool Comparison 2. Enhanced communication Skills 3. Critical Analysis 4. Objective Assessment 5. Subject understanding 6. Historical Knowledge 7. AI's impact on Art
Competences	1. Analytical thinking 2. Presentation and Communication 3. Critical thinking 4. Data-driven Learning 5. Crisis management skills 6. Global Diplomacy 7. Collaborative Decision making
Activities	7 distinct activities are mentioned in the Presentation: 1. Tool IT 2. Storytelling – AI vs ME 3. ExaminAItion 4. Historical Interviews 5. Tell the Real from the Fake 6. Relive History 7. Model AI-UN

PART D	ITC – UNI PLOVDIV- DOUKAS
Learning Objectives	1) Understanding AI Applications 2) Machine Learning basic knowledge 3) Environmental Awareness 4) Simplified algorithm understanding 5) Data set management 6) AI Application Awareness

Learning Outcomes	1) AI Problem Solving 2) Image recognition basics 3) Algorithmic intuition 4) Dataset Handling
Competences	1) Problem solving 2) Machine learning techniques 3) Collaborative Learning 4) Algorithmic thinking 5) Data Set Management 6) Problem-Solving with AI
Activities	4 distinct activities are mentioned in the Presentation: AI For Oceans Simplified Algorithm for Image Recognition Slice of Machine Learning Teachable Machine: Image-Audio-Pose

RESULT 2
TRAINING COURSE FOR FACILITATORS OF LEARNING IN AI-STEAME EDUCATION

ISBN 978-9963-713-51-6