AI4ED

TOWARDS AN AI DRIVEN EDUCATIONAL PROCESS INTEGRATING MODERN CAREERS IN THE EDUCATIONAL SYSTEM

Deliverable

D5.2 – Detailed Use Cases specification

Deliverable Lead: IMH Campus
Deliverable due date: 30/11/2023
Actual submission date:
Dissemination level:
Version: V0.1

This project has received funding from the European Union's Erasmus + programme under grant agreement No 101087543.

Document Control Page	
Title	Detailed Use Cases specification
Creator	IMH Campus
Description	This document contains the description of the different use cases designed by each partner of AI4Ed in each country.
Contributors	All partners
Creation date	12/09/2023
Type	Report
Language	English
Audience	☒ public ☐ confidential
Review status	☒Draft ☐ Assigned Reviewer accepted ☐ Coordinator accepted
Action requested	☐ to be revised by the Assigned Reviewer ☒ for approval by the Project Coordinator ☒ for acknowledgement by Partners

Revision history

Version	Author(s)	Changes	Date
V0	IMH Campus	Document creation	12/09/2023
V1	IMH Campus	Recollect information	12/11/2023
V2	IMH Campus	Document development	20/11/2023

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Glossary

EXECUTIVE SUMMARY / ABSTRACT

Abstract	This report focuses on the description of the different use cases designed by each partner of AI4Ed in each country. Concretely, an analysis of the teaching / learning process of students of different academic levels has been done. It hopes to ease the development, application and evaluation of learning environments, which have the potential to exploit the advantages of AI.
Keywords	Artificial intelligence, AI, education, learning

1 Introduction

This deliverable provides an in-depth exploration of various use cases, each carefully designed to align with the specific needs of different nations for proper deployment. Our approach, grounded in thorough research and strategic planning, shows a deep commitment to inclusive and effective global methodologies. Therefore, each use case harmonizes with the legal, socio-economic, and technological contexts of their respective nations. With this in mind, our organization offers solutions that bridge geographical divides and establish a new standard for excellence in international educational strategies.

The term *"use case"* may seem technical or specific to fields like software design and business analysis. But, in essence, a use case is a structured narrative that depicts potential scenarios where someone - the user - interacts with something - the system - in order to achieve a specific goal. Particularly, in the pedagogical field, a use case provides educators with a clear, detailed picture of the learner's journey, outlining the path from initial engagement to content mastery. Use cases in education aren't just about technical interactions, but also about human experiences, challenges, emotional highs and lows, and educational breakthroughs.

Embedding the concept of use cases in education requires a broader understanding of its nuances. Beyond the curriculum's technical or content-driven facets, an educational use case delves into the experiential elements of learning. It examines the various points of reference that educators and students encounter throughout the educational process. Such narratives might examine how digital platforms are reshaping classroom dynamics, or how a new pedagogical strategy is fostering deeper critical thinking among students. In essence, they are about connecting theoretical knowledge with tangible classroom realities.

Five detailed aspects that define a use case are:

1. **Clear Objective.** Every use case is anchored around a specific objective that describes in a clear way the end-goal or desired outcome the user seeks to achieve through the system. This ensures that the use case remains purpose-driven and focused on user satisfaction.
2. **Identified Actors.** A use case must clearly identify the primary actors (users) involved, as well as their roles. This could be an educator, a student, or any other stakeholder. Understanding the actor will guarantee that the system's interactions are tailored to the user's expectations and requirements.
3. **Sequential Steps.** Central to a use case is a series of sequential steps or actions that guide the user towards the achievement of the objective, which not only sets the path for user interaction but also provides a structured narrative of the system's functionalities.
4. **Preconditions and Postconditions.** A comprehensive use case outlines the initial conditions that must be met for the scenario to occur (preconditions) and the state of the system once the use case concludes (postconditions) in order to offer clarity on the context and the expected outcomes of the interaction.
5. **Alternative Flows.** While the primary flow describes the standard user-system interaction, a use case also accounts for alternative scenarios or exceptions that might arise, ensuring a comprehensive understanding of possible interactions.

A well-constructed educational use case poses several questions:

- How can a teacher employ technology to simulate real-world problems for lessons to be more relatable?
- How can feedback systems be optimized to provide real-time assistance to students struggling with a concept?
- How can collaborative tools be utilized to break down classroom walls to allow global interactions and enhance intercultural understanding?

The answers to these questions, framed within the structure of a use case, can offer educators a roadmap to innovative and effective teaching methods.

When mapped onto the field of education, use cases serve multiple roles. They act as a compass, guiding the integration of new tools or methodologies into the classroom to provide clarity; helping educators visualize the potential challenges and outcomes of adopting a new approach. And, by detailing the interaction points and expected outcomes, they also offer grounds for continuous improvement by enabling educators to measure the efficacy of their methods and iterate based on feedback.

With today's fast technological advancements, where digital tools are becoming essential tools in classrooms across the globe, the importance of these pedagogical use cases is heightened. They aid institutions in making informed decisions about tech integration, ensuring that technology serves as an enabler of education, not just a flashy addition. Rather than overshadowing the human element of education, tech is but a tool, one educators should employ to improve overall education.

2 SPAIN (IMH Campus)

1. Title

Analysis of the teaching / learning process of students of the ***Bachelor's Degree in Process and Product Innovation Engineering*** in the subject of ***Computer's Science.***

2. Description

The main objective of this project is to integrate artificial intelligence into the student experience. This integration aims to mitigate potential issues such as dropout risks while also enhancing positive outcomes by providing tailored content and course recommendations. This requires the collection and utilization of specific data to train the AI system. At IMH Campus, this data primarily originates from the Computer Science subject, where AI has been implemented to advance the project's comprehensive goal. Consequently, the Computer Science subject encompasses a range of activities focused on analysing students and their individual interests. Through the utilization of this data, the AI is anticipated to accurately predict three variables, ultimately leading to an enhancement of the teaching process.

3. Target group

This particular use case is tailored for students, specifically those enrolled in the ***Bachelor's Degree in Process and Product Innovation Engineering***. These students primarily consist of young individuals who have completed vocational training and seek to enhance their qualifications by pursuing engineering studies. Moreover, it is also tailored for high school graduates who are eager to embark on a journey into the field of engineering. Furthermore, this use case is also designed to benefit educators who aim to incorporate AI into their instructional methods.

4. Methodology

At IMH, the implementation began with one specific subject, precisely in the field of Computer Science. The contents covered in this subject include:

- Introduction to Calc
- Introduction to python
- Analysis in R

It is important to note that this subject is rooted in the Learning Factory approach, employing Problem-Based Learning (PBL) in every lesson.

In the pedagogical theoretical framework built for this European project, active learning and double channel learning are worth to mention. Active learning is centered around engaging students in the learning process through activities that require their active participation, fostering critical thinking and a deeper understanding of the subject matter. It encourages collaboration and teamwork, providing opportunities for students to learn from one another. On the other hand, the principle of double-channel learning emphasizes the integration of both visual and verbal elements in the educational process. This multimodal approach accommodates diverse learning styles, enhances comprehension, and aligns with cognitive load theory by spreading information across multiple channels, thereby optimizing the learning experience. Together, these principles contribute to a more dynamic and effective educational environment, promoting active engagement and catering to the varied preferences of learners.[1]

In this regard, there is strong support for the implementation of active methodologies, since they encourage the development of essential competencies for personal and professional growth, such as:

- Deep thinking or effective thinking, where learning results from thinking that should be creative, critical, metacognitive, and of high quality (Perkins, 2016). One of the roles of educators is to teach how to think, and deep thinking involves mastering and transforming the acquired knowledge to solve everyday real-life problems.

- Dialogic thinking, where language acts as a mediator both intrapsychologically and socially, influencing learning and unlearning. Mercer et al.'s (2016) approach, which links it to Chomsky's innatist perspective, Bruner's scaffolding, and dialogic teaching, seems very appropriate. Scaffolding benefits from Vygotsky's mediation approach where, through interaction with others using language, meaning is constructed, assimilated, and accommodated. Later, Rogoff (1990) focused on this within the family context, and Wells (1999) on creating dialogic inquiry communities.

- Cooperative work, which promotes greater communication, strengthening camaraderie and collaboration, which are indispensable for achieving integration and adaptation of all students.

- Creativity to involve and generate alternative ideas and search for original solutions from a constructivist perspective. As Piaget (1971) said, "to understand is to invent." It's about establishing new connections between what is already known and what is being learned, leading to meaningful and holistic knowledge.

- Inclusivity as a humanizing element fostering sensitivity. These methodologies promote cohesion and equality, breaking down marginalization and prejudices, and involving everyone in the teaching-learning process within the educational community. Thus, while forming competencies, values like inclusivity and interculturalism become fundamental in education itself (Alcalá del Olmo et al., 2020).

Project-Based Learning

When teachers introduce active methodologies in the classroom, the aim is to provide students with the conditions necessary for self-directed learning, promoting discovery-based learning and thinking skills. In this sense, Project-Based Learning (PBL), which includes cooperative or collaborative work and problem-solving, allows a series of activities that require full student engagement by creating meeting spaces (Marqués and Badía, 2014). This method facilitates the use of creative strategies that organize time and space by applying previously acquired skills and knowledge. It aims to stimulate student interests and concerns to relate the world they live in with the curriculum's content in a way that integrates the subjects to be taught (Ventura, 2013). The process bridges theory and practice, knowledge and action, constructing inspiring and creative teaching. Therefore, implementing PBL offers advantages such as:

1. Encouraging motivation through challenging situations.
2. Planning and developing learning based on identified needs.
3. Promoting cooperative learning.
4. Enhancing autonomy and metacognition.
5. Developing skills and competencies.
6. Enabling inclusive educational innovation to address diversity.

This method is structured around pedagogical keys such as (Syahril et al., 2019):

1. Meaningful learning.
2. Development of critical thinking.
3. Promotion of research.
4. Competency-based learning.
5. Learning how to learn.

Although it is considered a favorable pedagogical strategy for teaching in scientific areas, there's also the option of interdisciplinary projects through collaboration across various areas. This approach enables not only research, science, or technology but also understanding and deep, critical, and creative thinking (Healy, 2018). In summary, it's a constructivist approach (modeling-guidance) and a conducive environment that engages students in producing a final product using their ideas, debating, analyzing, designing, and culminating in results. It offers students the opportunity for purposeful, autonomous, and responsible learning, enhancing metacognition, effort, feedback, and improving evaluation (Johari & Bradshaw, 2008).

To further enhance the dynamism of this subject, H5Ps and questionnaires were integrated into Moodle, ultimately augmenting the satisfaction levels of student learning.

Two forms are required for the execution of this project, and students are responsible for completing both. The initial form assesses their interests and is administered at the outset of the course, while the second evaluates the material they have learned upon completion of the course.

In this manner, the AI system is designed to efficiently analyse this information, enabling it to predict the risk of student dropout and make appropriate recommendations for both content and courses.

5. Workflow / Process

In this section, the workflow process is outlined. At IMH, the Computer Science subject lessons last two hours. During these sessions, students first complete questionnaires related to previous lessons. These questionnaires, created by the teacher, are gathered in Moodle, where students can access and complete them. Additionally, access to these questionnaires is restricted to prevent any unauthorized behaviour. These specific limitations are set by the teacher.

Following this, the teacher uses various tools available in Moodle, such as H5Ps and files, to explain new content. This approach aims to engage students and make learning process both stimulating and meaningful.

At the conclusion of the explanations, students work in teams to conduct Problem-Based Learning (PBL) activities. The teacher serves as a resource that students can utilize to guide them through the activity, but not to complete it on their behalf. As the subject is Computer Science, the essential tools needed to complete it include a computer, internet connection, access to the Moodle platform and to the mentioned activities, all of which should be available on the platform.

6. Learning process agenda

In this section a learning process agenda is provided. At IMH Campus, Computer Science subject consists of 80 instructional hours, which are organized in the next way:

- Day 1: presentation of the subect, introduction of the PBL methodology, instalation of LibreOffice and Anaconda packages. Introduction to Calc spreadsheet.
- Day 2: importing data into spreadsheets.
- Day 3: arithmetic operations and basic functions.
- Day 4: arithmetic operations and basic functions.
- Day 5: conditional formatting.
- Day 6: data organization functions.
- Day 7: data filtering.
- Day 8: pivot tables.
- Day 9: charts.
- Day 10: PBL activity.
- Day 11: PBL activity.
- Day 12: introduction to programming. Flowcharts.
- Day 13: introduction to Python.
- Day 14: constants, variables and basic data types. Strings.
- Day 15: complex data structures.
- Day 16: control structures.
- Day 17: “while” loop.
- Day 18: “for” loop.
- Day 19: functions.

- Day 20: exceptions.
- Day 21: files.
- Day 22: PBL activity.
- Day 23: PBL activity.
- Day 24: PBL activity.
- Day 25: other functions.
- Day 26: clases, modules and packages. Libraries.
- Day 27: PBL activity.
- Day 28: PBL activity.
- Day 29: Introduction to R and RStudio.
- Day 30: R as a calculator.
- Day 31: vectors and other list types.
- Day 32: matrices.
- Day 33: dataframes.
- Day 34: PBL activity.
- Day 35: PBL activity.
- Day 36: PBL activity.
- Day 37: PBL activity.
- Day 38: PBL activity.
- Day 39: PBL activity.
- Day 40: Exam.

3 GERMANY (UBREMEN)

1. **Title**

Analysis of the learning processes in the technical field of **AM** (additive manufacturing) based on 27 online learning units.

2. **Description**

The main objective of this project is to integrate artificial intelligence into the learners' experience. This integration aims to mitigate potential issues to an enhancement of the learning process taking into account the learners' initial competences, learning style and pace, enhancing positive outcomes by providing practical activities and interactive contents supported by active learning approaches.

The required data to train the AI system will be gathered via ITB/U_Bremen learning platform (moodle) in three different stages of the learning process: before the start of the course (moodle questionnaire), during the course (tracking navigation patterns on moodle), upon finishing the course (moodle questionnaire).

3. **Target group**

This use case is aiming both at higher education (HE) students and apprentices; upcoming engineers or skilled workers in technical domains.

4. **Methodology**

Project and case study are based in self organised online learning (without teacher guidance). Over the 27 hours (estimated time), learners are free to find their own ways to navigate through the learning units – navigation patters of those who succeed or drop out will deliver the data for "dropout prevention" and "individualised tutoring".

The learners' performance over each case study is monitored via moodle grades/reports related to assessments, learning contents time consumed, achievements, etc.

Beyond learning activities, two forms are required for the execution of this project, and learners are responsible for completing both. The initial form assesses their interests and is administered at the outset of the course, while the second evaluates their estimation of their learning experience.

In this manner, the AI system should be designed to efficiently analyse this information, enabling it to predict the risk of dropout and make appropriate recommendations for both content and courses.

5. **Learning process**

This use case is tailored for individual learning, emphasizing a personalized and self-directed approach rather than being designed for group or guided training settings. It is crafted to cater to the unique needs and pace of individual learners, allowing them to engage with the content independently.

6. **Programme**:

The program is meticulously designed to be individually tailored, ensuring that each participant can navigate through the curriculum at their unique pace and follow their distinct learning path. By allowing individuals to set their own pace and choose their learning trajectory, the program aims to create a flexible and personalized educational experience that caters to the specific needs and preferences of each learner. The course is available in the next url: https://metals.mobil-lernen.com/en/elearning

4 PORTUGAL (CENFIM)

1. Title

Analysis of the training and learning process in the technical field of **CNC** (Programming & Machining) based on short training units of 50 h in the context of **long-life learning.**

2. Description

The main objective of this project is to integrate artificial intelligence into the trainee experience. This integration aims to mitigate potential issues to an enhancement of the learning process taking into account the trainee's initial competencies, learning style and pace, enhancing positive outcomes by providing practical activities and interactive contents supported by active learning approaches.

The necessary data for training the AI system will be collected through the CENFIM learning platform (Moodle) at three distinct stages of the learning process: prior to the course commencement (via a Moodle questionnaire), during the course (involving Moodle learning activities and practical tasks), and upon completion of the course (through a Moodle questionnaire).

3. Target group

This use case is mainly aimed at trainees enrolled in the CNC training course in **individual training modality**. These trainees are active or unemployed adults who want to consolidate and/or acquire competencies in the area of CNC programming and machining.

4. Methodology

Project and case study based learning is the key approach. Over the 50 hours (estimated time), trainees develop a project that requires them to acquire a set of knowledge and skills throughout the execution of small case studies (practical scenarios). The development of the case studies takes into consideration the previous knowledge and skills as well as the trainee´s learning pace.

Moodle is used as a knowledge database shared by both trainees and trainers, presenting different typologies of learning contents, resources and activities. In addition to learning contents, trainees use moodle to receive guidance and validation of practical activities.

The trainee´s performance over each case study is monitored via moodle grades/reports related to quizzes, self-assessment forms, learning contents time consumed, practical activities achievements, etc.

Beyond learning activities, two forms are required for the execution of this project, and trainees are responsible for completing both. The initial form assesses their interests and is administered at the outset of the course, while the second evaluates the material they have learned upon completion of the course.

In this manner, the AI system is designed to efficiently analyse this information, enabling it to predict the risk of student dropout and make appropriate recommendations for both content and courses.

5. Learning process

As already mentioned, this use case applies to individual training and not group training. In this sense and by the methodology described previously there is a standard list for programming and machining training units (sequence of recommended case studies) for individuals who are just starting in CNC but which is personalized in the case of individuals who already have knowledge and skills in the area, means that a trainee can navigate through each case study at their unique pace and follow their distinct learning path.

Both training units are face to face but those that are beginners in CNC can first start online (moodle platform, also used on face to face) with a set of initial case studies related to fundamentals of CNC. These case studies, described below, have a total of 20h (estimated time) and will be the focus of CENFIM use case. The success achieved in the online learning is the condition for the trainee to start the workshop learning activities.

CASE STUDY #1 - Machine Acquisition

Case Study framework (SCORM)

Learning contents & Activities
Fundamentals of CNC Tecchnology (SCORM)
QUIZ – CNC Tecnology
CNC Machines – Typlogies & Movements (SCORM)
QUIZ – CNC Machines

Case Study validation (QUIZ)

CASE STUDY #2 – Process Planning

Case Study framework (SCORM)

Learning contents & Activities
Milling operations (SCORM)
QUIZ – Milling operations
Process plannning applied to CNC (SCORM)
Process plan data sheet – Sample (PDF)
QUIZ – Process Planning

Case Study validation (QUIZ)

CASE STUDY #3 – Tools & Cutting Data

Case Study framework (SCORM)

Learning contents & Activities
Cutting tools applied in milling operations (SCORM)
QUIZ – Milling cutting tools
Tool Data & Cutting parameters (SCORM)
QUIZ – Tool Data & Cutting parameters

Case Study validation

Case Study #3.1 – Validation
Catalogue & Work Sheet (PDF)

Roughing Tool (Validation) (QUIZ)

Case Study #3.2 – Drilling Tool (Validation) (QUIZ)

Catalogue & Work Sheet (PDF)

Drilling Tool (Validation) (QUIZ)

Case Study #3.3 – Tapping Tool (Validation) (QUIZ)

Catalogue & Work Sheet (PDF)

Tapping Tool (Validation) (QUIZ)

CASE STUDY #4 – Workholding devices

Case Study framework (SCORM)

Learning contents & Activities

Workholding devices - fundamentals (SCORM)

QUIZ – Workholding devices

Case Study validation

Technical Data Sheet - Device (PDF)

Roughing Tool (Validation) (QUIZ)

CASE STUDY #5 – Axes System & Datum

Case Study framework (SCORM)

Learning contents & Activities

CNC Machine – Axes system & References (SCORM)

QUIZ – Axes system & References

Coordinates system (SCORM)

QUIZ – Coordinate in space

Case Study validation

Enginnering Drawing (PDF)

Programming data sheet (PDF)

Programming Sheet (Validation) (QUIZ)

5 SLOVENIA (SCSKZ)

Title:

Analysis of the training and learning process "**Programming U-lab"** (learning laboratory on the principle of Fab Lab), which is a part of open curriculum **in the educational program Mechanical technician** (V. level of education, which ends with a vocational high school diploma).

Description:

A mechanical technician deals with construction and design, produces and uses technical and technological documentation and edits and archives it using modern tools, designs and constructs simple elements and devices. Manages and adjusts numerically controlled machining and other machines and devices. In his work, he can lead a group in production, maintenance, service and other activities, he can also lead a small independent company.

The open part of the curriculum of educational programs, which is briefly called the open curriculum, allows schools to co-design part of the educational program and adapt to the needs of the environment and social partners, which significantly contributes to strengthening their autonomy. There are 595 of these hours in the mechanical technician program over four years.

The U-lab programming module is implemented in the scope of 50 hours in the second year of mechanical engineering. Within the module, which is presented below, 5 lessons are devoted to the topic "artificial intelligence".

Target group

Students in the second year of the mechanical engineering program (aged 16-17). Additionally, the entire module can be offered in a course format for external stakeholders and as an interest group for high school students as part of the students' free-choice options.

Methodology

The module is conducted according to the principles of active learning and in-depth thinking, culminating in the student's ability to create their own model. Working in groups and pairs enables more active communication, brainstorming, and the development of soft skills such as teamwork, cooperation, responsibility, and encouragement to solve real-life problems. Finding original solutions and fostering creative behavior are also emphasized. The transition to individual student work and direct tutoring by the teacher is an important phase in the learning process, leading to meaningful and integrated knowledge.

The latter is also extremely important in cases of inclusion, providing individuals with the opportunity for inclusive acquisition of knowledge, additional explanations, guidance through the steps of abilities, and the acquisition of knowledge and skills. The majority of the content in the open module is presented in the form of project work, with results and project presentations taking place annually in April as part of technical days. This approach encourages and activates individuals to take responsibility for the product, think creatively, utilize various time management strategies, employ different equipment, materials, and other resources, and apply the acquired theoretical knowledge into practice.

Students also have access to the course via MS Teams, where they can actively participate in debates, submit materials/assignments for preview and confirmation, and access learning materials.

Lessons are conducted in pairs or groups, designed to be interactive, and tailored to students with the assistance of two additional teachers. When creating their own model, each student benefits from an individual approach.

It is implemented in a computer classroom equipped with workstations, appropriate software, and 3D glasses...

Throughout the course implementation, we also make direct reference to the modules within the AI4ED educational program, indicating the module relevant to the individual topic.

Learning process

PUL (programming U-LAB)

1. Basics of Arduino	5 hours
The student learns to think algorithmically, becomes acquainted with the basic functioning of programming languages, and gains knowledge about data types, logical operators, loops, and subroutines. Additionally, the student learns the basics of working with Arduino and electronics. They acquire knowledge about basic electronic elements and assemble them into simple circuits in combination with Arduino.	
2. Artificial intelligence (more detailed description below)	5 hours
3. VR and XR technologies	40hours
The student learns to understand the fundamental concepts and applications of virtual reality in the Unity development environment. They acquire the ability to use various modes of interaction and navigation within the VR environment, install and configure VR software in the Unity VR environment, utilize 3D models, activate objects, and incorporate sensations, touches, and sounds into VR projects. Additionally, the student develops the skill to design simple applications.	

Part 1: Introduction to Artificial Intelligence (30 minutes)

- **1.1. What is artificial intelligence**
  - An introduction to the definition and history of artificial intelligence
  - Explaination of basic concepts like machine learning, deep learning, etc.
- **1.2. Use of artificial intelligence**
  - Examples of use in everyday life and industry (use of AI tools in phones – cameras, translators, use of mobile assistants...)
  - Presentation of the AI4ED project (partners, purpose of the project, goals...) **M1**

Part 2: Basics of Machine Learning (1 hour)

- **2.1. Basic concepts of machine learning M2**
  - Supervised learning, unsupervised learning, reinforcement learning
  - Examples of tasks that can be solved with machine learning (recognition of product shape using PICKIT and PYhton, Universal Robot - photo)
- **2.2. Data and databases**
  - The importance of quality data
  - Presentation of popular databases such as Zenodo

Part 3: Practical example - Classification of objects (3 hours)

- **3.1. Preparation of M3 data**
  - Uploading and researching data from a suitable existing Zenodo database (example…)
  - Preparation of data for learning, database maintenance and Ethics **M4** and **M7**
- **3.2. Model creation**
  - Creation of a simple classification model using Python **M2** tool and scikit-learn library (data analysis prediction)
- **3.3. Model learning**
  - Supervised model learning on collected data for Pattern Recognition
- **3.4. Evaluation of the model**
  - Evaluation of model performance using parameters such as accuracy, precision and responsiveness

Part 4: Deep Learning (30 minutes)

- **4.1. What is deep learning**
  - Explanation of the concept and examples of the use of **M8**
- **4.2. Neuronal models**
  - Introduction to neural networks

Part 5: Conclusion and future work (15 minutes)

- **5.1. Processing of short practice tasks and indication of the direction of the solution using AI**
  - Obtaining the student's grade
- **5.2. Current trends and the future of artificial intelligence**
- **5.3. Resources for further learning**

Recommended reading, courses and online resources

6 Training Programme

1. Title

Different uses of artificial intelligence in the education and training process.

2. Description

The incorporation of artificial intelligence (AI) systems in a course developed within the fourth work package (WP4). The AI implementation will span various stages of the course, initially focusing on personalizing content based on individual needs using adaptive algorithms. Throughout the course, AI will facilitate interactive interactions, provide instant feedback, and dynamically adjust the pedagogical approach. Towards the course's conclusion, the AI systems will assess overall performance, identify areas for improvement, and deliver personalized recommendations for continuous learning. The overarching goal is to optimize the course's effectiveness and relevance through this comprehensive use of artificial intelligence.

3. Target group

Educators from vocational training institutions who are eager to integrate artificial intelligence into their courses will find valuable insights and resources in our program. Likewise, university professors looking to incorporate the latest advancements in AI into their curriculum will discover practical approaches and support. Additionally, students with a keen interest in the field of artificial intelligence are encouraged to explore our offerings, as our program provides a platform for acquiring in-depth knowledge and hands-on experience in this rapidly evolving and impactful domain.

4. Methodology

The instructional approach adopted by our organization incorporates an active learning methodology, ensuring an engaging and dynamic learning experience for participants. Through an interactive introduction, an engaging infographic will be crafted to present the objectives and key themes of the module in a visually appealing manner. Complementing this, an explainer video, lasting no more than 3 minutes, will be developed. This video will articulate essential concepts with clarity, employing examples, animations, and visual elements for enhanced understanding. A written summary will further distill the key points, serving as a quick reference guide. As a valuable resource, a compilation of main resources including articles, web links, books, PDF documents, and other materials will be provided to deepen participants' knowledge. Evaluation will be facilitated through a comprehensive test incorporating various question formats. Lastly, applied practices, such as exercises, projects, case studies, or simulations, will be proposed, allowing participants to practically apply acquired knowledge.

5. Workflow / Process

The program is organized in the next modules:

1. Description of the context and objectives of the project
2. Introduction to AI
3. Data management planning and artificial intelligence
4. Maintenance and monitoring of AI models
5. Project KPIs
6. Active and personalized teaching, dropout prevention, and AI
7. Ethics and artificial intelligence
8. Toolkit

Each module within the program is designed to be completed as a standalone unit, offering participants the flexibility to choose specific topics of interest. However, to qualify for the certification, participants must fulfill specific conditions, ensuring a comprehensive and well-rounded engagement with the content. Meeting these conditions may involve successful completion of assessments, active participation in discussions, or other criteria established to demonstrate a thorough understanding of the material. The certification process emphasizes the importance of holistic learning and ensures that participants have not only explored individual modules but have also integrated their knowledge across the program.

6. Learning process agenda

Number	Module Description	Estimated Duration
1	Description of the context and objectives of the project	1 hour
2	Introduction to AI	2 hour
3	Data management planning and artificial intelligence	3-6 hour

4	Maintenance and monitoring of AI models	1 hour
5	Project KPIs	2 hour
6	Active and personalized teaching, dropout prevention, and AI	1 hour
7	Ethics and artificial intelligence	6 hour
8	Toolkit	2 hour

This workflow outlines the sequential order of modules within the project, each assigned a specific estimated duration. The program begins with an hour dedicated to providing a comprehensive understanding of the project's context and objectives. Subsequently, participants will engage in a 2-hour session introducing them to the fundamentals of artificial intelligence. The third module, focusing on data management planning and artificial intelligence, allows for a flexible duration ranging from 3 to 6 hours to ensure thorough coverage. Following this, participants will spend an hour delving into the maintenance and monitoring of AI models, followed by a 2-hour session dedicated to understanding and establishing Project Key Performance Indicators (KPIs). The sixth module, encompassing active and personalized teaching, dropout prevention, and AI, is allocated an hour. Ethics and artificial intelligence take center stage in the seventh module, spanning 6 hours for an in-depth exploration. Finally, the program concludes with a 2-hour session dedicated to the toolkit, providing practical resources and tools for participants.

7 Conclusions

As conclusions, it is posible to state that in this deliverable, we have outlined how to implement artificial intelligence in 5 use cases, where 4 are directly applied to the student body, and the fifth is the course that should be developed within this project. This course is aimed at both students and teachers interested in the implementation of artificial intelligence in education.

8 References

[1] Mayer, 2014. (PDF) Active Blended Learning: Definition, Literature Review, and a Framework for Implementation.