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AI4ED

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

Deliverable

D4.2 - AI4Ed Training Framework

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V2	IMH, ALL partners	Revisions implemented.	23.09.2024
V3	IMH	Framework ready.	30.09.2024

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Glossary

AI	Artificial Intelligence
DMP	Data management Plan
FAIR	Findability, Accessibility, Interoperability, and Reusability
GDPR	General Data Protection Regulation
IT	Information technology
KPI	Key Performance Indicator
MOODLE	Modular Object-Oriented Dynamic Learning Environment
MS	Microsoft
PDF	Portable Document Format
SCORM	Sharable Content Object Reference Model
VET	Vocational Education and Training

EXECUTIVE SUMMARY / ABSTRACT

Abstract	This deliverable outlines the AI4ED Training Framework, building on the principles and methodologies defined in Deliverable D4.1 (AI4ED Training Programme). The framework aims to provide educators, institutions, and stakeholders with clear guidance for implementing AI-enhanced educational practices. This framework is aligned with the project's overarching goal of integrating AI into the educational landscape to enhance personalized tutoring, active learning, and dropout prevention. It serves as a guide to delivering the training programme effectively while addressing ethical considerations, data management, and KPI monitoring.
Keywords	Training programme, AI in educational process, Ethics, Transparency, data management planning, data processing, KPI indicators, good practices, legal aspects, AI4Teacher, AI4students, digCom, lifelong learning.

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I Objectives of the AI4ED Training Framework

Program Name: **Implementing AI in education and training processes. What to take into account for a smooth transition**

The AI4ED Training Framework is designed to provide a structured approach to the implementation and integration of artificial intelligence (AI) into educational processes across various institutions and educational levels. By focusing on both the technological and pedagogical aspects of AI, the framework seeks to empower educators, students, and institutions to embrace AI-driven innovations in teaching and learning. The following key objectives underpin the framework:

1. Facilitate the integration of AI technologies into educational systems across Europe.
2. Provide a structured "train the trainers" model to equip educators with the necessary skills and knowledge.
3. Ensure the ethical use of AI, particularly concerning data privacy and transparency.
4. Promote collaborative learning environments and personalized tutoring supported by AI.
5. Enable the development of key competencies, including AI literacy, data management, and lifelong learning, as outlined in the Digital Competence Framework (DigComp) and LifeComp.

2 Scope of the Training Framework

The AI4ED Training Framework is designed to be comprehensive, addressing the diverse needs of various stakeholders within the educational ecosystem. It targets different educational levels, including, vocational education and training (VET), and higher education. Furthermore, it addresses both the pedagogical and technical aspects of AI, ensuring that each group involved in the educational process is equipped with the necessary skills and knowledge to integrate AI technologies effectively.

2.1 Teachers/Lecturers

One of the central aims of the AI4ED Training Framework is to empower educators with the knowledge and tools necessary to integrate AI into their teaching practices. Teachers and lecturers are on the front lines of education, and their role in incorporating AI into the classroom is crucial. The framework provides them with practical and theoretical training to use AI in the following ways:

- **Incorporating AI-based pedagogies**: Teachers will learn how to apply AI-driven personalized learning strategies that tailor instruction to individual students' needs. This includes adapting content delivery based on student performance and utilizing AI to provide real-time feedback on assignments.
- **Improving student engagement**: AI tools can help educators create more engaging, interactive lessons through gamification, simulations, and adaptive learning platforms. Teachers will be trained on using AI-driven platforms to facilitate a more dynamic, student-centered learning environment.
- **Assessment and evaluation**: AI can assist in automating routine tasks like grading and assessment. The training will guide teachers on how to use AI tools for creating quizzes, assignments, and tests, and automatically evaluating them, which will save time and increase efficiency.
- **Lifelong learning and professional development**: The framework also focuses on instilling a culture of continuous learning among educators, ensuring they stay updated with the latest AI advancements and their applications in education. It encourages teachers to develop their digital competencies, as outlined in the **Digital Competence Framework (DigCompEdu)**.

2.2 Students/VET Students

Students, particularly those in vocational education and training (VET), are a primary focus of the AI4ED Training Framework. As AI continues to influence the future of work, it is critical to equip students with the necessary AI literacy and skills to thrive in an increasingly automated and data-driven job market.

- **AI literacy and foundational knowledge**: The training framework introduces students to the basic concepts of AI, including machine learning, natural language processing, and data analytics. This foundational knowledge will help them understand how AI systems work and where they are applied in various industries.
- **Career preparedness**: By embedding AI into their learning experience, students will be better prepared for the AI-driven job market. Whether they are pursuing careers in technical fields or non-technical domains, understanding AI applications and implications will be crucial. VET students, in particular, will learn how AI is reshaping industries such as manufacturing, healthcare, finance, and information technology.
- **Ethical considerations**: As part of their AI education, students will also explore the ethical implications of AI, such as privacy concerns, bias in algorithms, and the societal impacts of automation. This will foster critical thinking about the responsible use of AI technologies.
- **Practical application and problem-solving**: Through project-based learning and real-world case studies, students will apply their AI knowledge to solve problems. This hands-on approach ensures they gain practical experience in using AI for tasks such as data analysis, predictive modeling, and automation.

3 Structure of the Training Programme

The AI4ED Training Programme is designed to provide a comprehensive and flexible approach to integrating artificial intelligence (AI) into education, targeting various stakeholders, including teachers and students. The programme is structured into carefully designed modules that address different facets of AI in education, ensuring that participants acquire both theoretical knowledge and practical skills.

The AI4ED Training Programme is divided into eight core modules that collectively cover the essential aspects of AI integration in education. Each module is designed to be stand-alone but interconnected, allowing participants to build their skills progressively. Below is an in-depth look at how the training programme is structured.

3.1 Core Modules

The AI4ED Training Programme is built around eight key modules, each addressing a specific area of AI in education. These modules range from introductory topics, such as understanding AI and data management, to more advanced themes like personalized learning, ethics, and AI toolkits.

Module 1: Introduction to the AI4ED Project

- **Focus**: This introductory module provides participants with an overview of the AI4ED project, including its goals, objectives, and the key outcomes that the consortium seeks to achieve.
- **Content**: Theoretical discussion on the importance of AI in transforming education, the role of the AI4ED project, and its expected impact on stakeholders.
- **Competencies**: Familiarity with AI4ED objectives and understanding the project's approach to AI-enhanced education.
- **Duration**: 1 hour (theoretical).

Module 2: Introduction to AI

- **Focus**: A foundational module introducing the concept of artificial intelligence and its applications in various industries, with a specific focus on education.
- **Content**: Covers AI fundamentals, machine learning, deep learning, and examples of AI applications in different sectors, including education.
- **Competencies**: Understanding AI basics, types of AI, and its transformative potential in teaching and learning processes.
- **Duration**: 3 hours (2 hours theoretical, 1 hour practical).

Module 3: Data management, semantics and formats

- **Focus**: This module focuses on the crucial role of data in AI systems, particularly in educational contexts, emphasizing proper data management and ethical practices.
- **Content**: Topics include types of data generated in education, data formats, the importance of Data Management Plans (DMPs), and ensuring data complies with **FAIR** principles (Findability, Accessibility, Interoperability, and Reusability).

- **Competencies**: Participants will learn how to plan, collect, and manage data for AI applications in education, with a focus on privacy and ethical use of data.
- **Duration**: 3-6 hours (theoretical and practical combined).

Module 4: Key Performance Indicators (KPIs) for AI in Education

- **Focus**: This module delves into defining and utilizing Key Performance Indicators (KPIs) to measure the success and impact of AI integration in educational environments.
- **Content**: Explains how to select, define, and implement effective KPIs that can monitor personalized learning, student engagement, and dropout prevention.
- **Competencies**: Participants will understand how to use KPIs to evaluate AI-enhanced educational systems and their effectiveness in achieving specific learning outcomes.
- **Duration**: 1 hour (integrated theoretical and practical).

Module 5: Ethics and Artificial Intelligence

- **Focus**: This module covers the ethical challenges posed by the use of AI in education, such as data privacy, algorithmic bias, and fairness.
- **Content**: Introduces EU ethics standards for AI, ethical guidelines for educators, and strategies for handling ethical dilemmas related to AI in education.
- **Competencies**: Participants will develop the skills to ensure transparency, accountability, and fairness in the use of AI systems and handle data responsibly.
- **Duration**: 2 hours (1 hour theoretical, 1 hour practical).

Module 6: Implementation curriculum and recommendations for the preparation of educational program material

- **Focus**: Participants will be introduced to the **AI4ED Toolkit**, a set of practical tools and resources designed to help educators implement AI-based methods in their classrooms.
- **Content**: Covers the structure and components of the toolkit, its practical applications, and how it integrates with other modules to support teaching and learning.
- **Competencies**: Participants will learn to use the toolkit effectively to implement AI solutions in their educational settings.
- **Duration**: 1 hour (practical focus).

Module 7: Active and Personalized Teaching, Dropout Prevention, and AI

- **Focus**: This module emphasizes the practical application of AI to create personalized learning experiences and reduce dropout rates.
- **Content**: Discusses how AI can support active learning by identifying students' strengths and weaknesses, offering tailored learning materials, and monitoring engagement levels.

- **Competencies**: Participants will acquire practical knowledge on how to use AI to personalize instruction, engage students, and implement dropout prevention strategies.
- **Duration**: 6 hours (3 hours theoretical, 3 hours practical).

Module 8: Maintenance and Monitoring of AI Models

- **Focus**: This module focuses on the technical aspects of maintaining and monitoring AI systems in educational environments to ensure they function as intended.
- **Content**: Covers the importance of regularly updating AI models, monitoring their performance, and ensuring they remain aligned with ethical standards.
- **Competencies**: Participants will learn to maintain AI systems, troubleshoot issues, and update models to ensure their continued effectiveness and ethical compliance.
- **Duration**: 2 hours (1 hour theoretical, 1 hour practical).

3.2 Competencies and Skills Targeted

The AI4ED Training Programme aims to develop key competencies across different areas of AI application in education. The **Digital Competence Framework for Educators (DigCompEdu)** and **Lifelong Learning Competence Framework (LifeComp)** serve as foundational models for defining these competencies, which include:

- **Digital Literacy**: Understanding AI technologies, their limitations, and applications in education.
- **Data Management Skills**: Ability to manage, interpret, and analyze educational data ethically and effectively.
- **Pedagogical Competence**: Integration of AI into teaching strategies to promote personalized learning and enhance student engagement.
- **Ethical Competence**: Awareness of ethical issues surrounding AI, including privacy, fairness, and transparency in educational contexts.
- **Problem-Solving Skills**: Using AI tools to solve educational challenges, such as identifying at-risk students and improving instructional outcomes.

3.3 Modular Flexibility

The AI4ED Training Programme is designed to be **modular and flexible**, allowing participants to follow the programme at their own pace. This ensures that the training can be adapted to different schedules and learning needs. Each module can be taken as a standalone unit, but together they provide a comprehensive understanding of how to implement and manage AI in education.

- **Standalone Modules**: Participants can choose to focus on individual modules depending on their specific role, making the programme accessible and relevant to different professional needs.
- **Progressive Learning Path**: For those looking for a more holistic learning experience, the modules are designed to build on each other, gradually deepening the participant's understanding of AI's role in education, from basic concepts to advanced applications.

3.4 Certification and Assessment

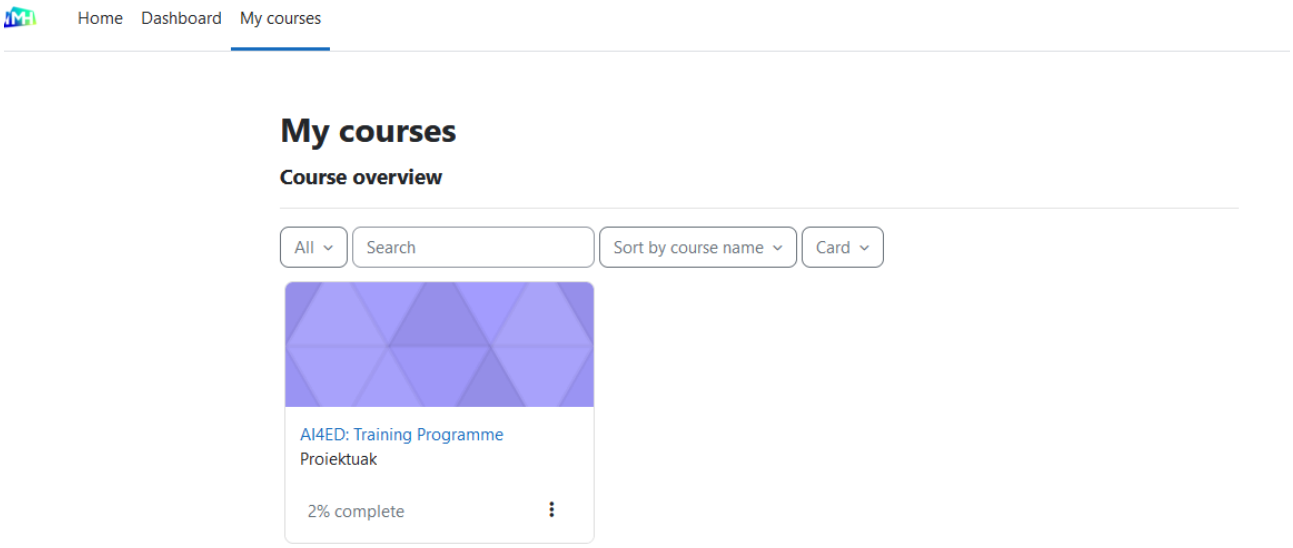
Upon completion of the training programme, participants will receive a **Certificate of Attendance**, validating their proficiency in applying AI in educational contexts. The programme will include:

- **Pre- and Post-Training Assessments**: These will measure participants' understanding of AI concepts and their ability to apply them in practical settings. The results will help evaluate the effectiveness of the training.
- **Ongoing Support**: Participants will have access to post-training resources, including the AI4ED toolkit, case studies, and an online community for continued learning and support (EDEHub).

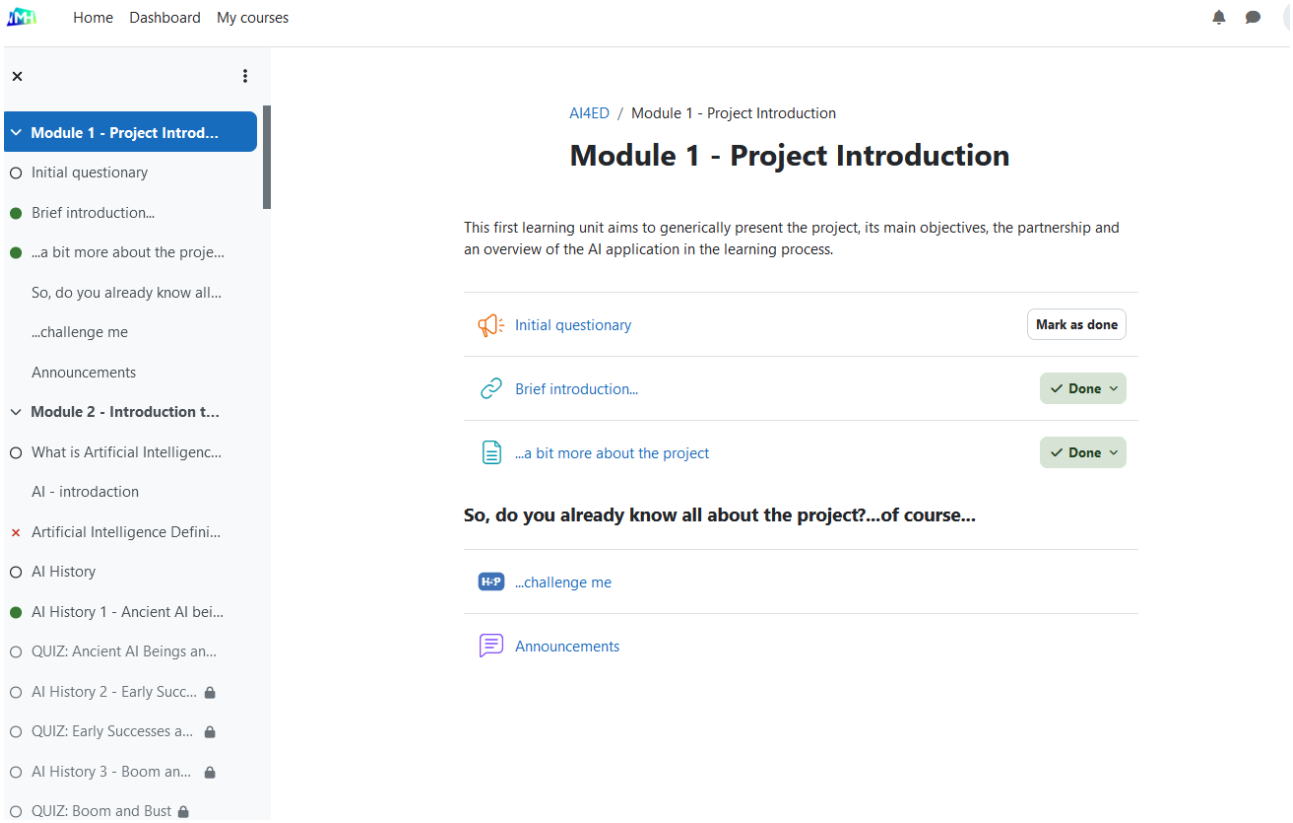
4 Developed Moodle for the Training Framework

Following the description of the training framework we present screenshots of the moodle platform itself.

Principal view when logging to the moodle platform:



Module 1 Overview:



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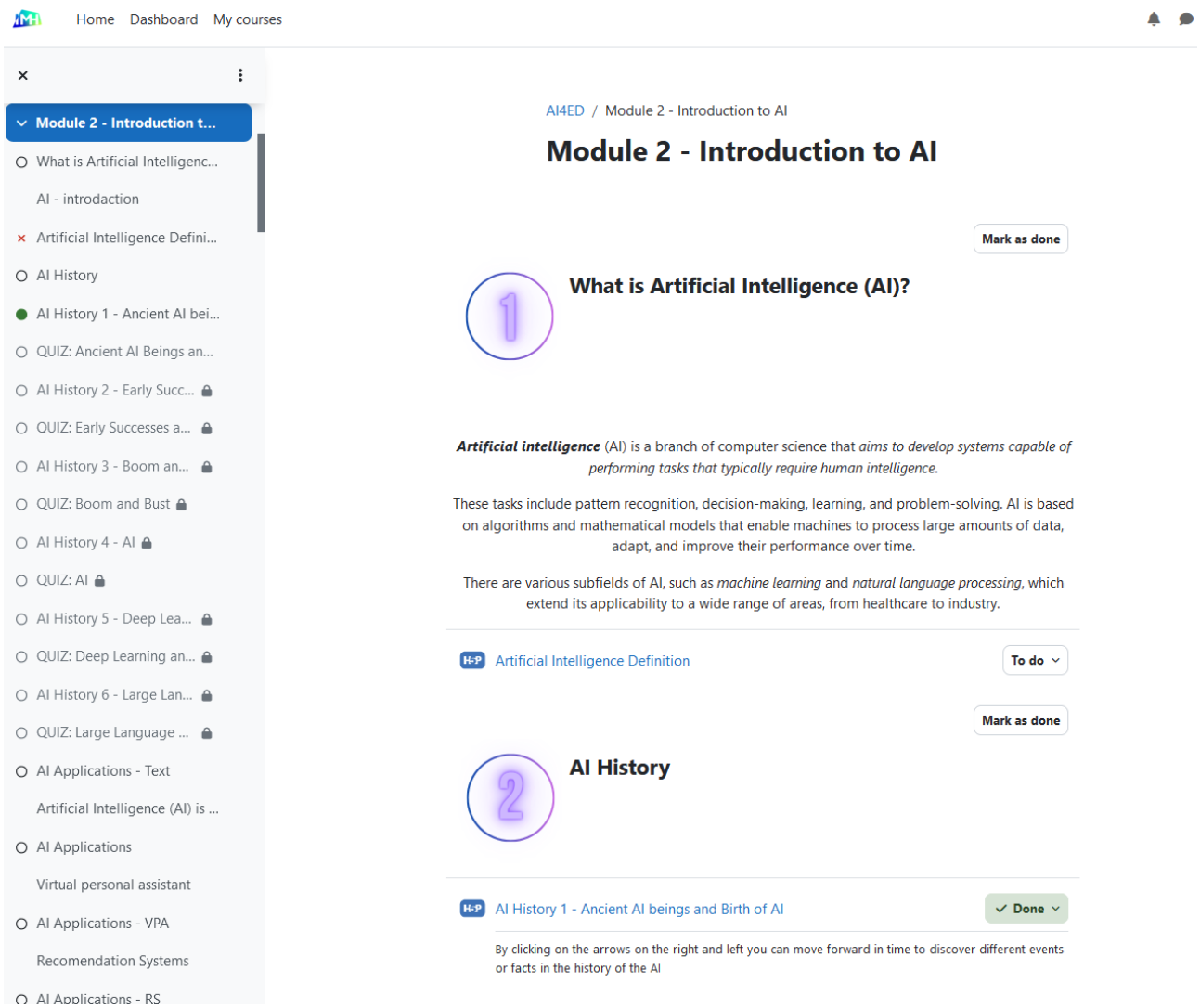

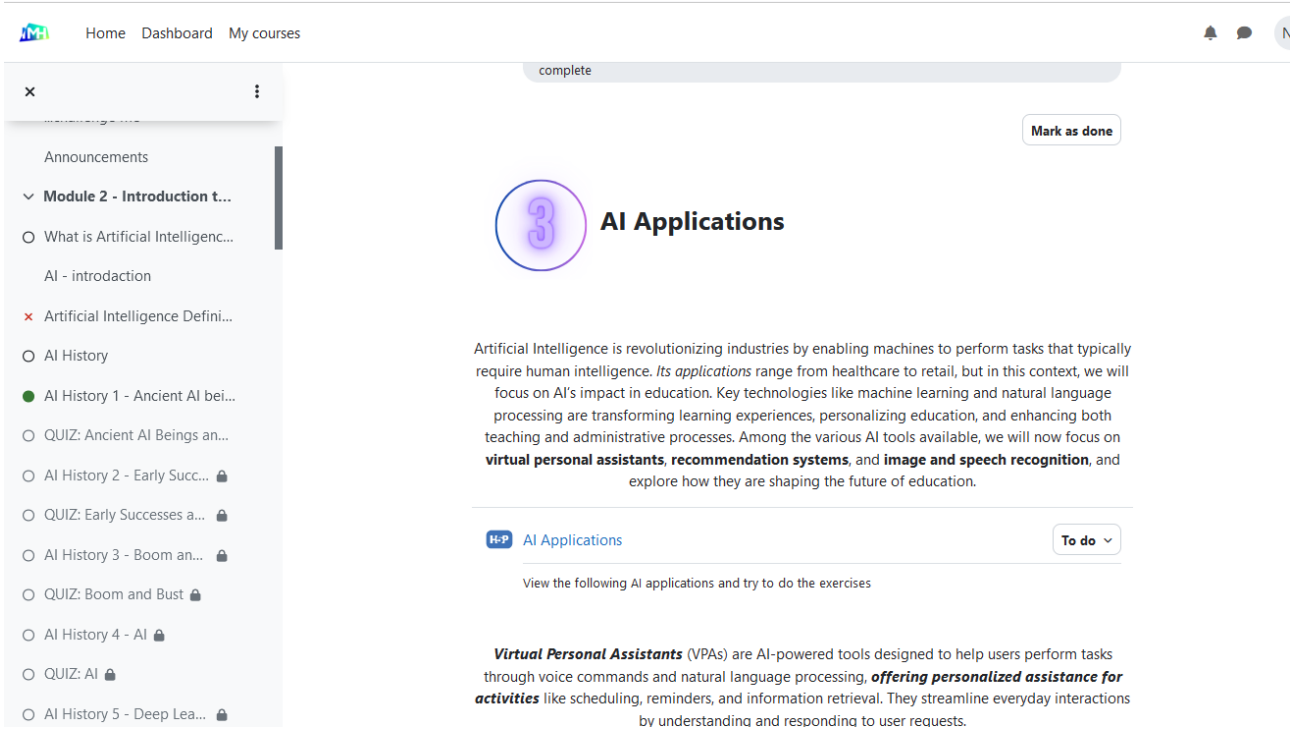
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complete
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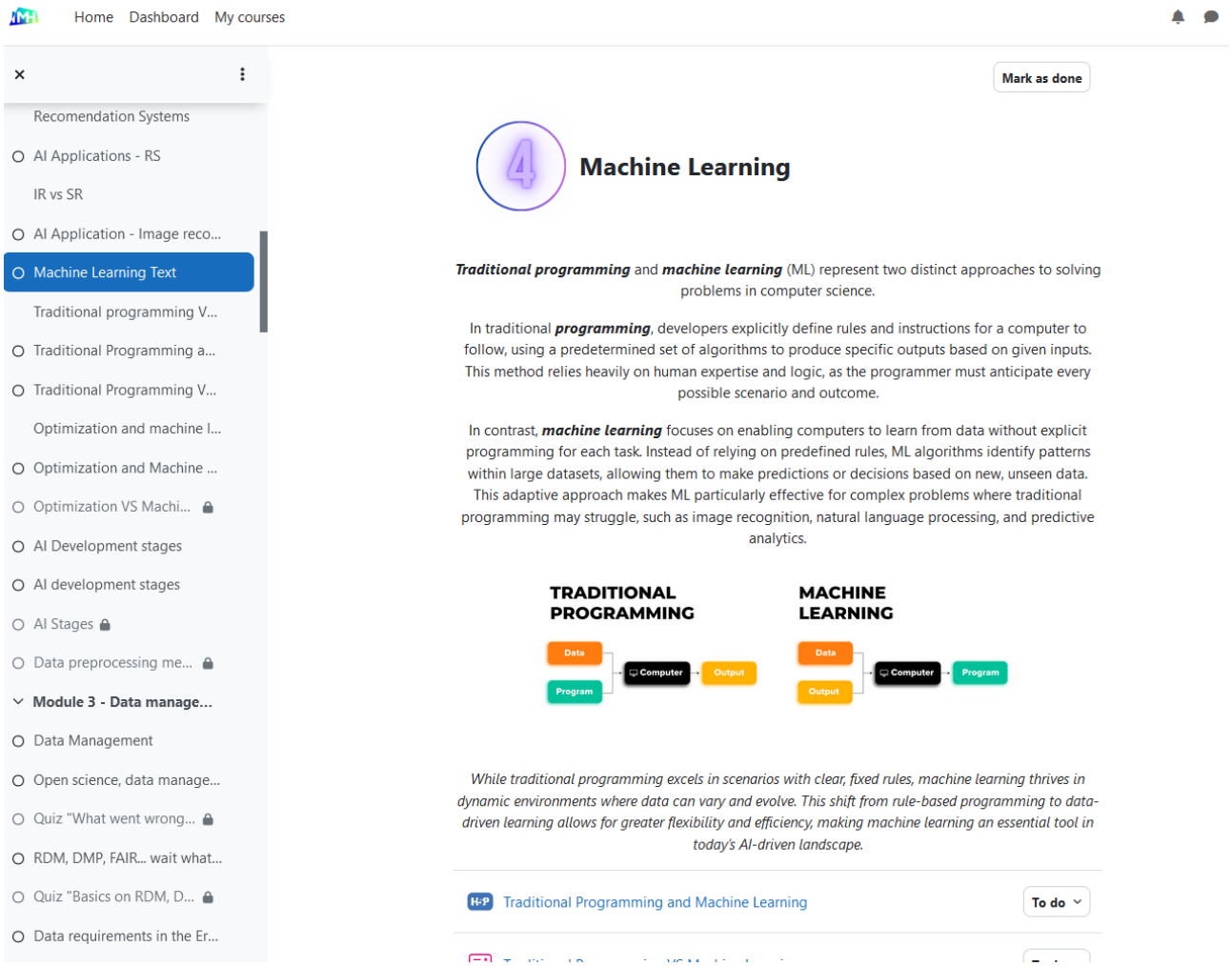
Announcements
Module 2 - Introduction t...
What is Artificial Intelligenc...
AI - introdaction
Artificial Intelligence Defini...
AI History
AI History 1 - Ancient AI bei...
QUIZ: Ancient AI Beings an...
AI History 2 - Early Succ...
QUIZ: Early Successes a...
AI History 3 - Boom an...
QUIZ: Boom and Bust
AI History 4 - AI
QUIZ: AI
AI History 5 - Deep Lea...
3
AI Applications
Artificial Intelligence is revolutionizing industries by enabling machines to perform tasks that typically require human intelligence. Its applications range from healthcare to retail, but in this context, we will focus on AI's impact in education. Key technologies like machine learning and natural language processing are transforming learning experiences, personalizing education, and enhancing both teaching and administrative processes. Among the various AI tools available, we will now focus on virtual personal assistants, recommendation systems, and image and speech recognition, and explore how they are shaping the future of education.
AI Applications
To do
View the following AI applications and try to do the exercises
Virtual Personal Assistants (VPAs) are AI-powered tools designed to help users perform tasks through voice commands and natural language processing, offering personalized assistance for activities like scheduling, reminders, and information retrieval. They streamline everyday interactions by understanding and responding to user requests.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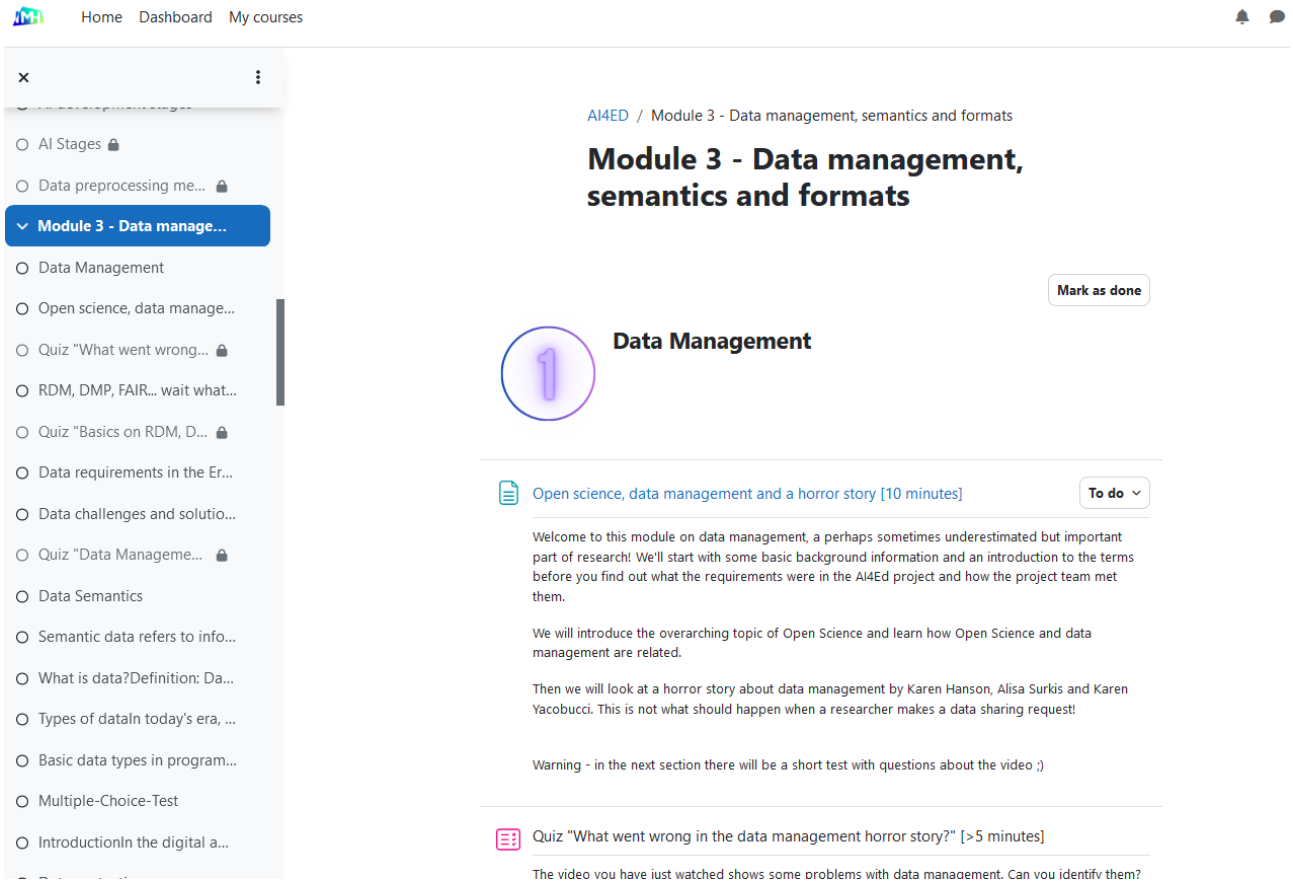
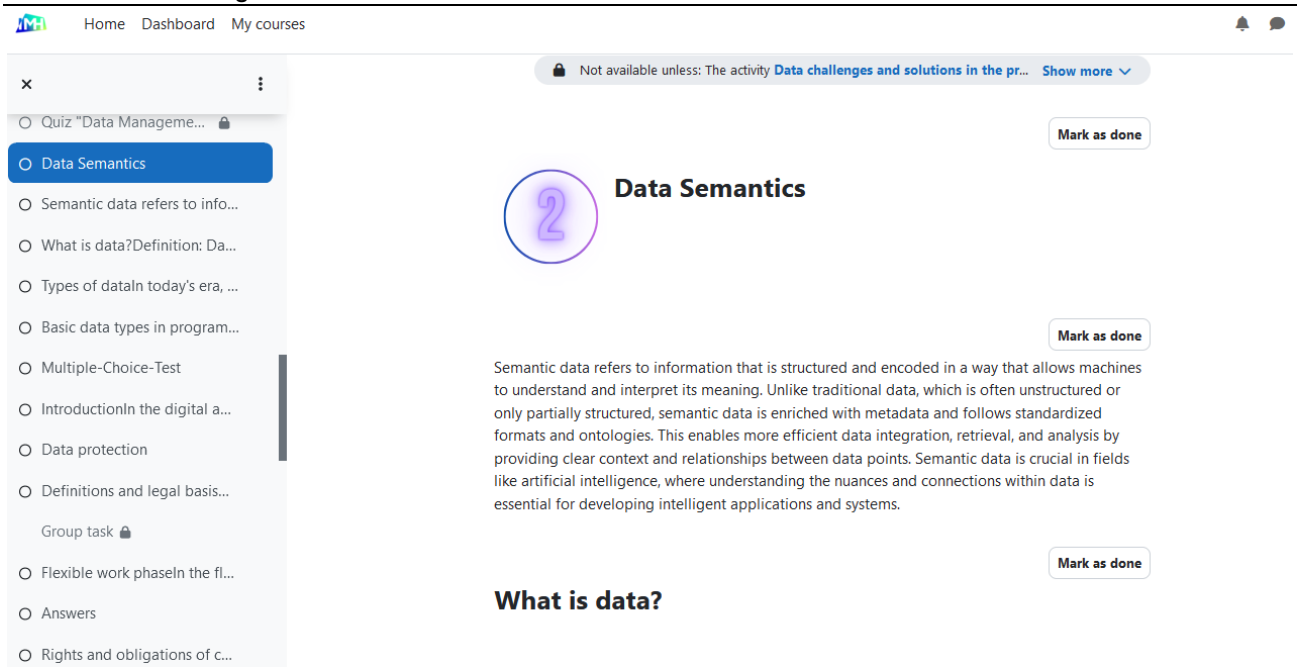
Recomendation Systems
AI Applications - RS
IR vs SR
AI Application - Image reco...
Machine Learning Text
Traditional programming V...
Traditional Programming a...
Traditional Programming V...
Optimization and machine l...
Optimization and Machine ...
Optimization VS Machi...
AI Development stages
AI development stages
AI Stages
Data preprocessing me...
Module 3 - Data manage...
Data Management
Open science, data manage...
Quiz "What went wrong...
RDM, DMP, FAIR... wait what...
Quiz "Basics on RDM, D...
Data requirements in the Er...
4
Machine Learning
Traditional programming and machine learning (ML) represent two distinct approaches to solving problems in computer science.
In traditional programming, developers explicitly define rules and instructions for a computer to follow, using a predetermined set of algorithms to produce specific outputs based on given inputs. This method relies heavily on human expertise and logic, as the programmer must anticipate every possible scenario and outcome.
In contrast, machine learning focuses on enabling computers to learn from data without explicit programming for each task. Instead of relying on predefined rules, ML algorithms identify patterns within large datasets, allowing them to make predictions or decisions based on new, unseen data. This adaptive approach makes ML particularly effective for complex problems where traditional programming may struggle, such as image recognition, natural language processing, and predictive analytics.
TRADITIONAL PROGRAMMING
Data
Program
Computer
Output
MACHINE LEARNING
Data
Output
Computer
Program
While traditional programming excels in scenarios with clear, fixed rules, machine learning thrives in dynamic environments where data can vary and evolve. This shift from rule-based programming to data-driven learning allows for greater flexibility and efficiency, making machine learning an essential tool in today's AI-driven landscape.
Traditional Programming and Machine Learning
To do

Module 3 Overview:

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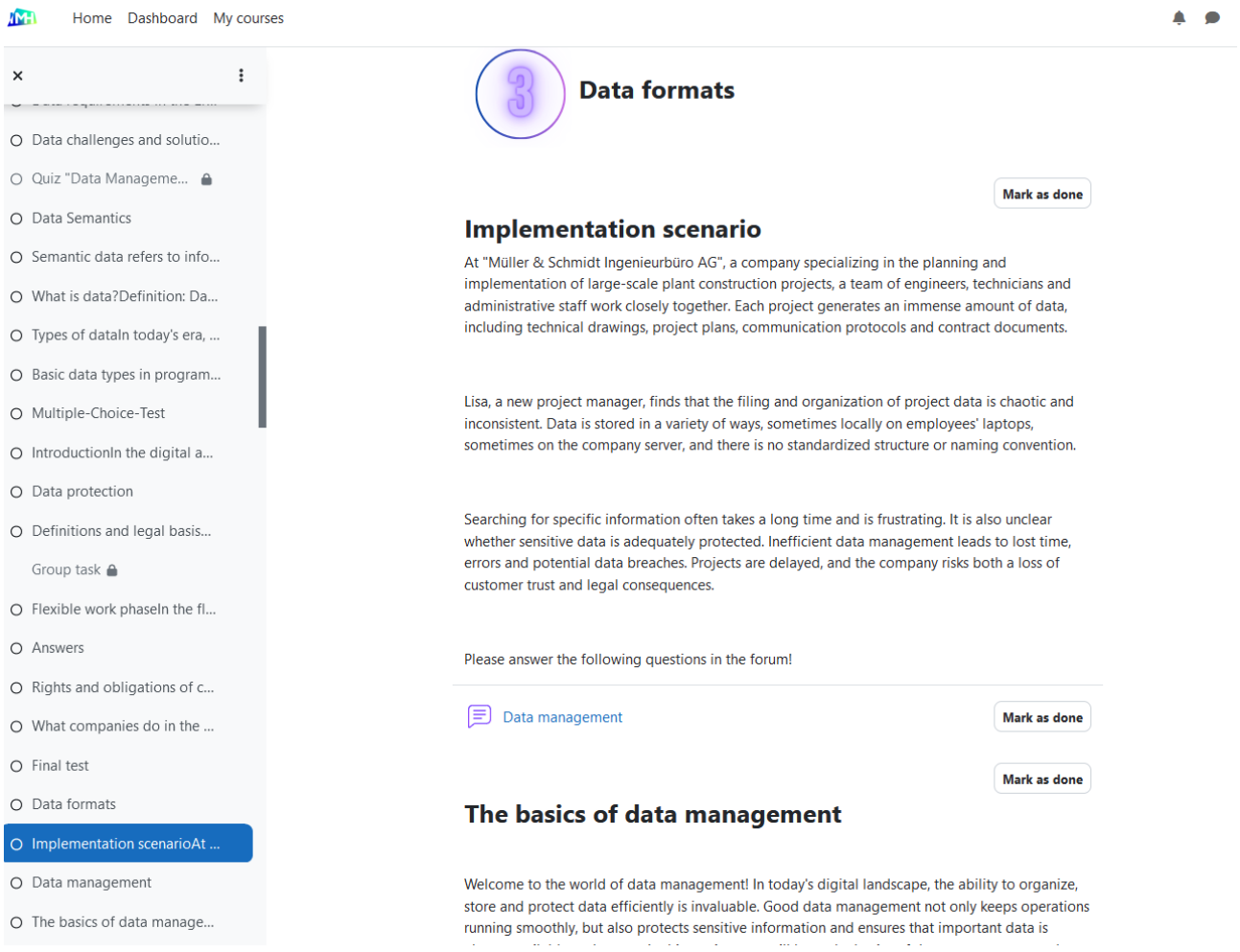
Not available unless: The activity Data challenges and solutions in the pr... Show more
Mark as done
Data Semantics
Mark as done
Semantic data refers to information that is structured and encoded in a way that allows machines to understand and interpret its meaning. Unlike traditional data, which is often unstructured or only partially structured, semantic data is enriched with metadata and follows standardized formats and ontologies. This enables more efficient data integration, retrieval, and analysis by providing clear context and relationships between data points. Semantic data is crucial in fields like artificial intelligence, where understanding the nuances and connections within data is essential for developing intelligent applications and systems.
Mark as done
What is data?
Quiz "Data Manageme...
Data Semantics
Semantic data refers to info...
What is data?Definition: Da...
Types of dataIn today's era, ...
Basic data types in program...
Multiple-Choice-Test
IntroductionIn the digital a...
Data protection
Definitions and legal basis...
Group task
Flexible work phaseIn the fl...
Answers
Rights and obligations of c...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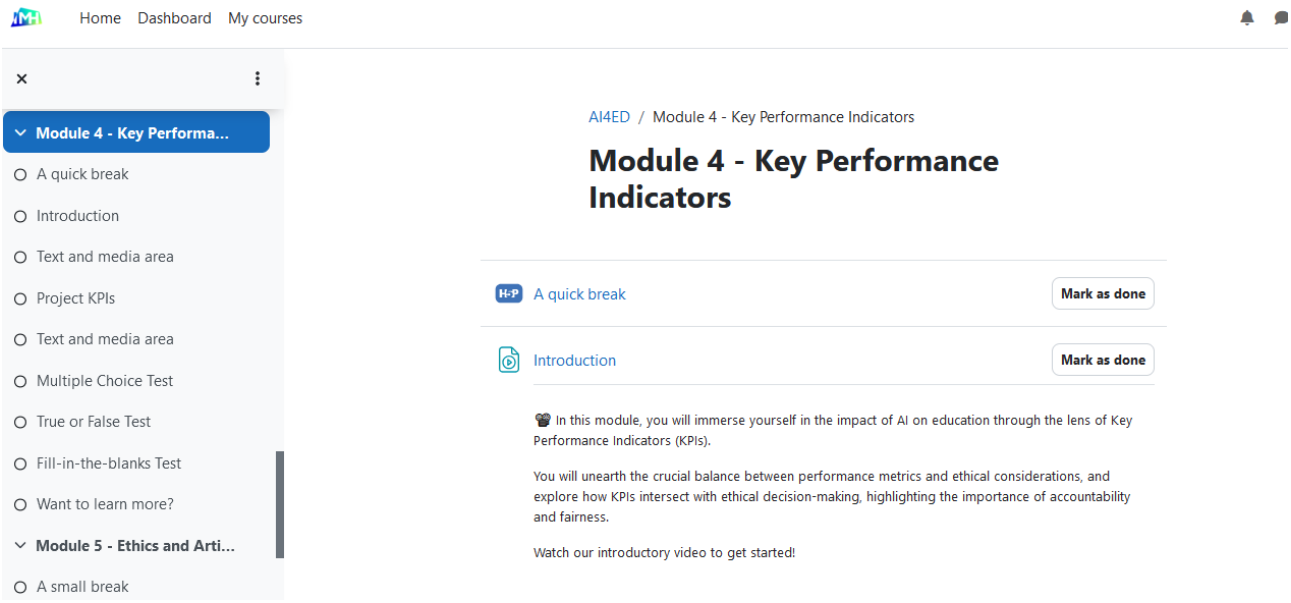
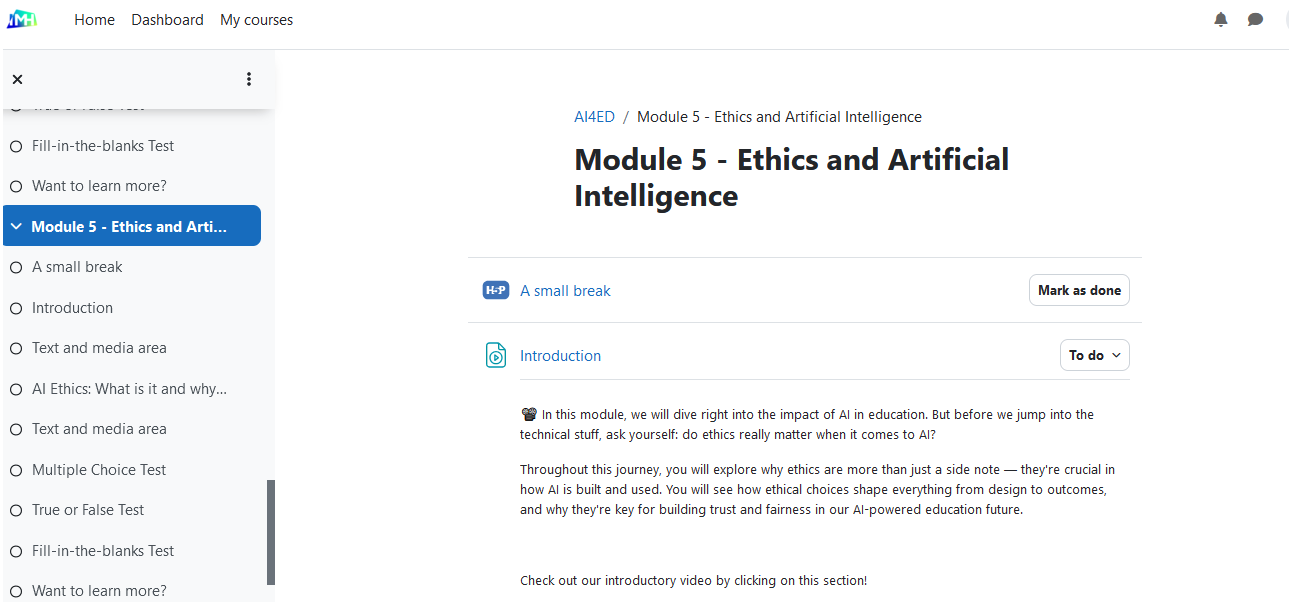
Data formats
Mark as done
Implementation scenario
At "Müller & Schmidt Ingenieurbüro AG", a company specializing in the planning and implementation of large-scale plant construction projects, a team of engineers, technicians and administrative staff work closely together. Each project generates an immense amount of data, including technical drawings, project plans, communication protocols and contract documents.
Lisa, a new project manager, finds that the filing and organization of project data is chaotic and inconsistent. Data is stored in a variety of ways, sometimes locally on employees' laptops, sometimes on the company server, and there is no standardized structure or naming convention.
Searching for specific information often takes a long time and is frustrating. It is also unclear whether sensitive data is adequately protected. Inefficient data management leads to lost time, errors and potential data breaches. Projects are delayed, and the company risks both a loss of customer trust and legal consequences.
Please answer the following questions in the forum!
Data management
Mark as done
Mark as done
The basics of data management
Welcome to the world of data management! In today's digital landscape, the ability to organize, store and protect data efficiently is invaluable. Good data management not only keeps operations running smoothly, but also protects sensitive information and ensures that important data is
Data challenges and solutio...
Quiz "Data Manageme...
Data Semantics
Semantic data refers to info...
What is data?Definition: Da...
Types of dataIn today's era, ...
Basic data types in program...
Multiple-Choice-Test
IntroductionIn the digital a...
Data protection
Definitions and legal basis...
Group task
Flexible work phaseIn the fl...
Answers
Rights and obligations of c...
What companies do in the ...
Final test
Data formats
Implementation scenarioAt ...
Data management
The basics of data manage...

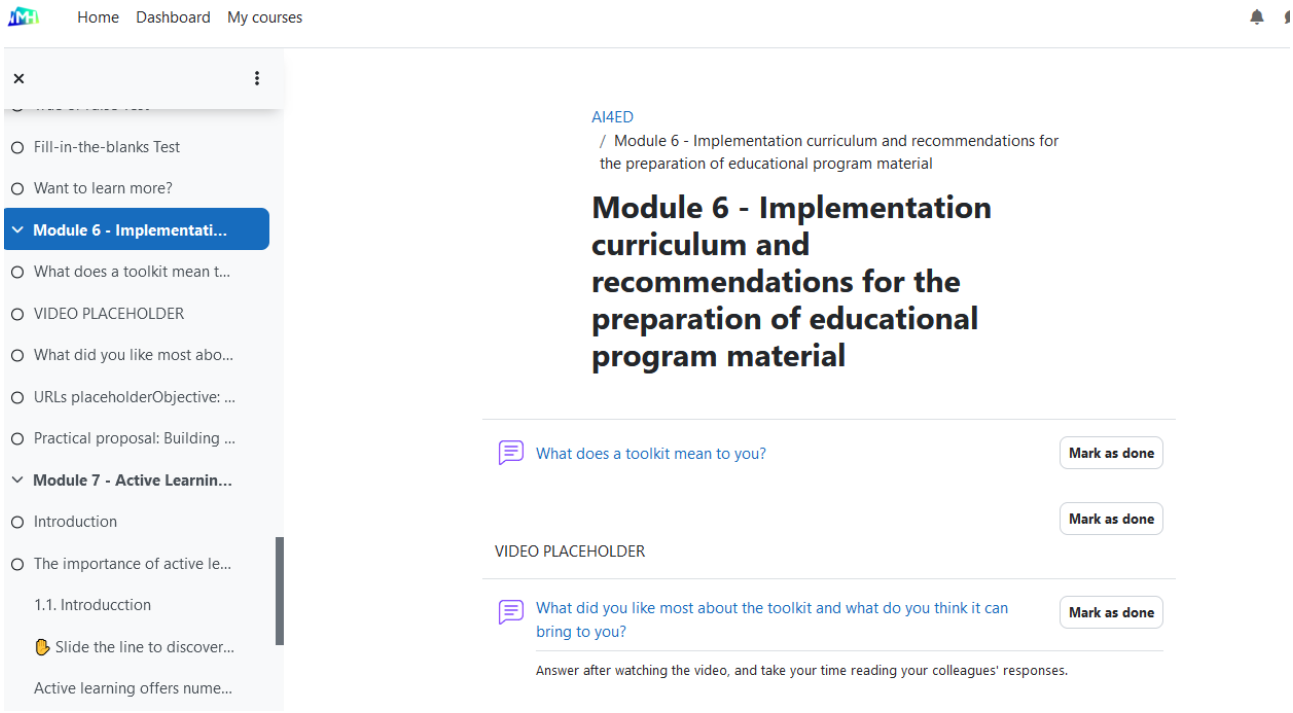
Module 4 Overview:



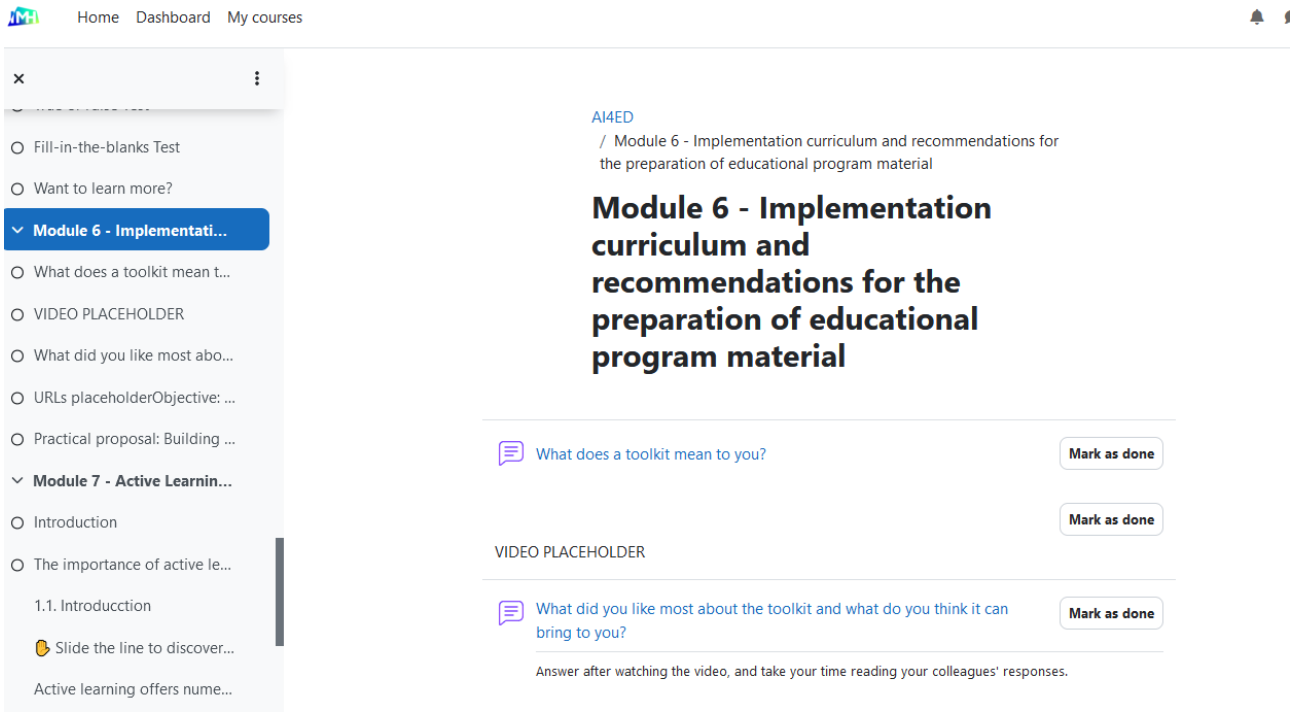
Module 5 Overview:

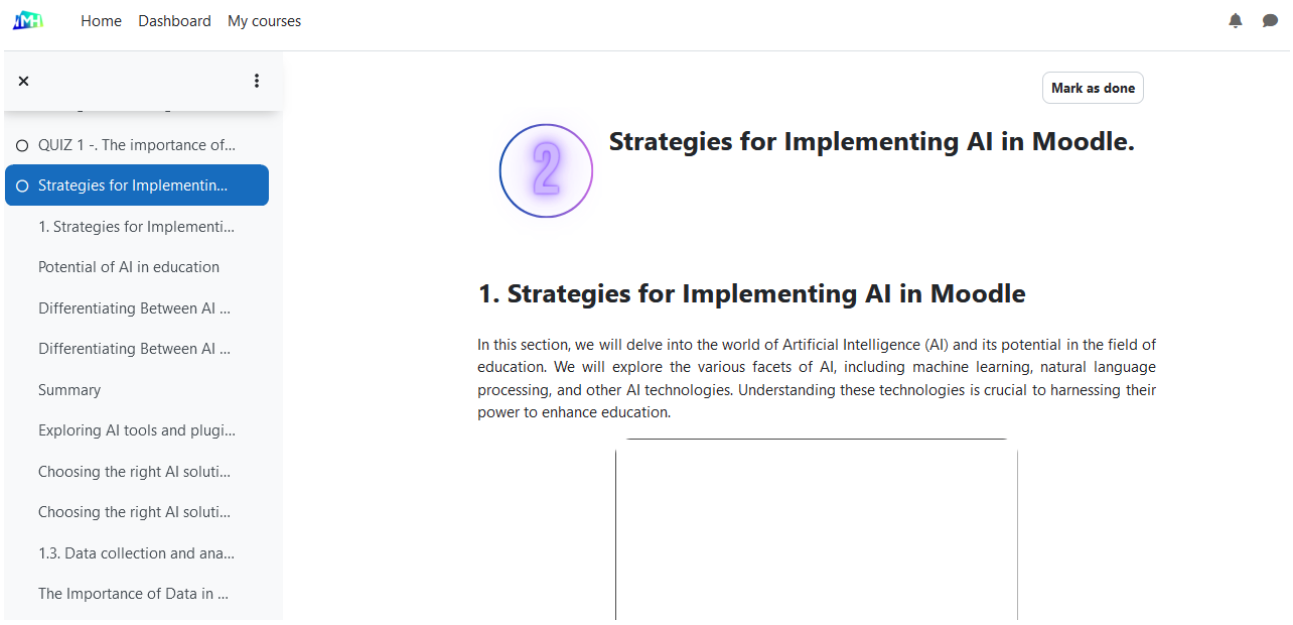


Module 6 Overview:



Module 7 Overview:




Home
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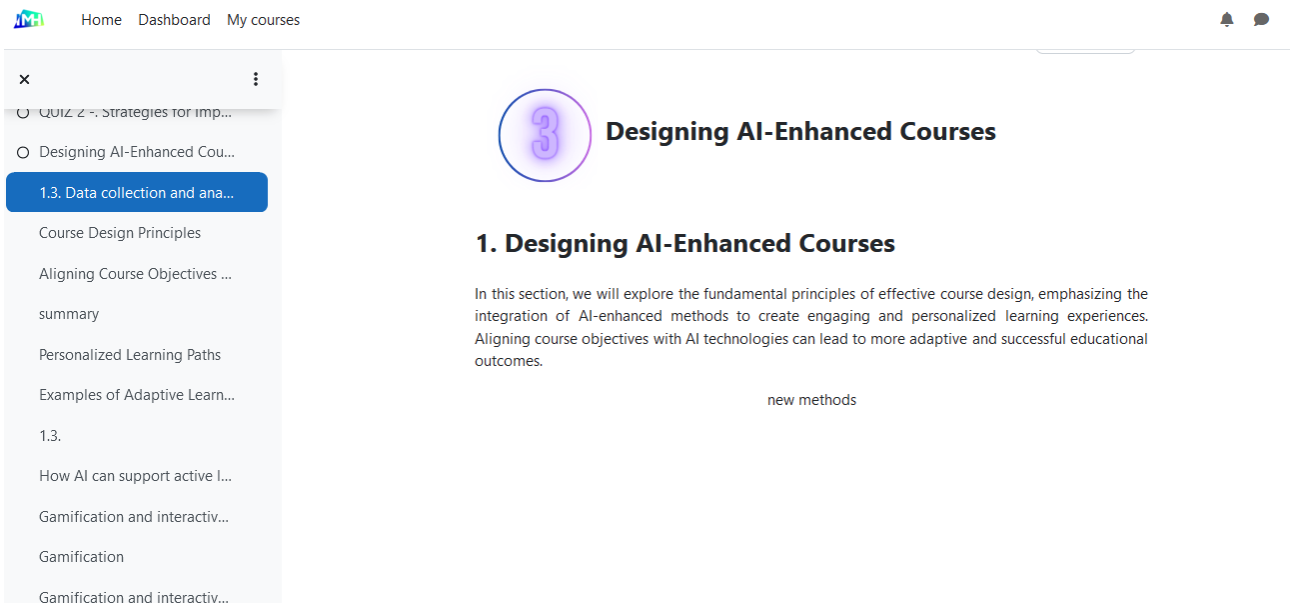
QUIZ 1 -. The importance of...
Strategies for Implementin...
1. Strategies for Implementi...
Potential of AI in education
Differentiating Between AI ...
Differentiating Between AI ...
Summary
Exploring AI tools and plugi...
Choosing the right AI soluti...
Choosing the right AI soluti...
1.3. Data collection and ana...
The Importance of Data in ...
Mark as done
2
Strategies for Implementing AI in Moodle.
1. Strategies for Implementing AI in Moodle
In this section, we will delve into the world of Artificial Intelligence (AI) and its potential in the field of education. We will explore the various facets of AI, including machine learning, natural language processing, and other AI technologies. Understanding these technologies is crucial to harnessing their power to enhance education.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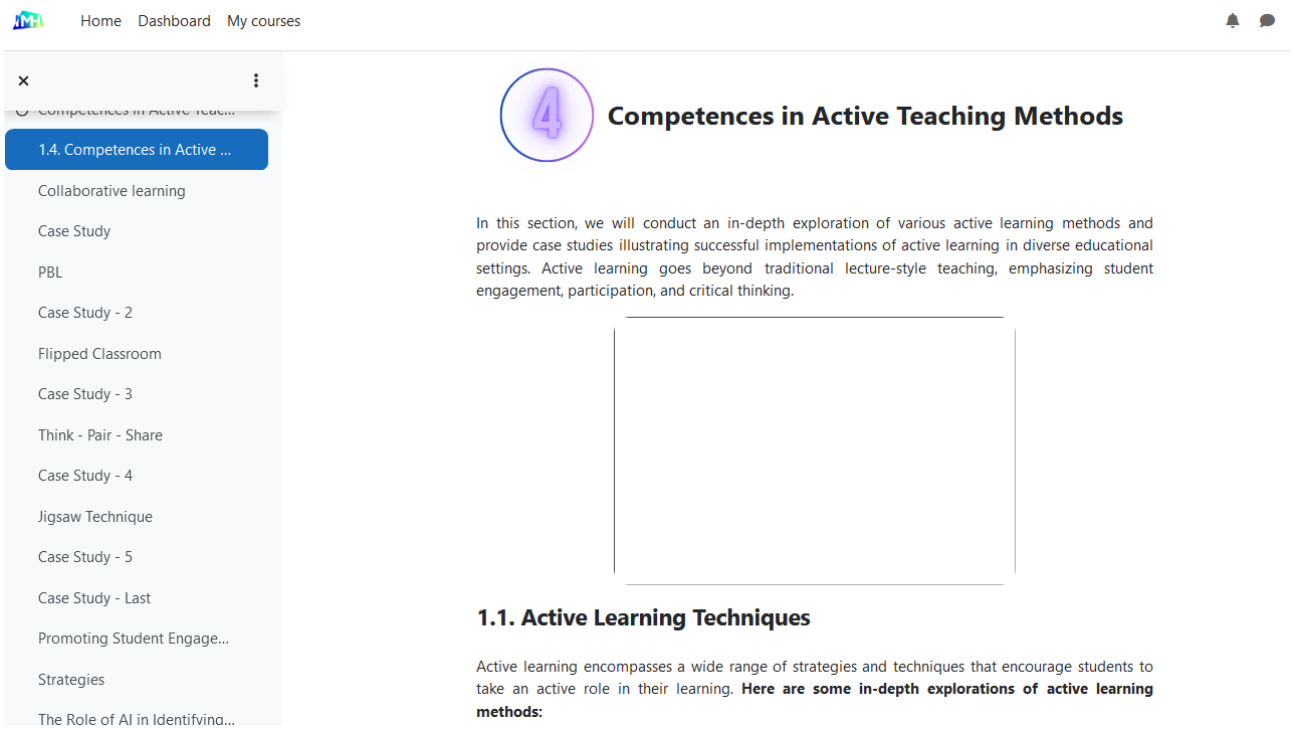
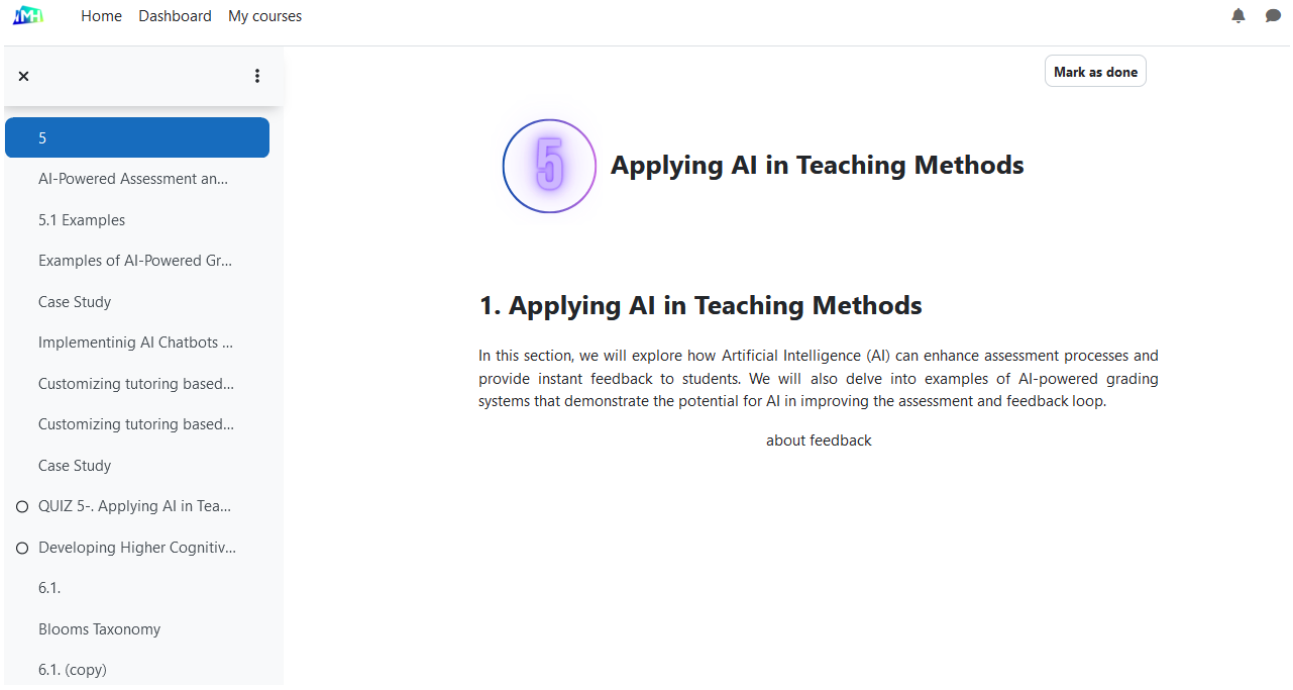
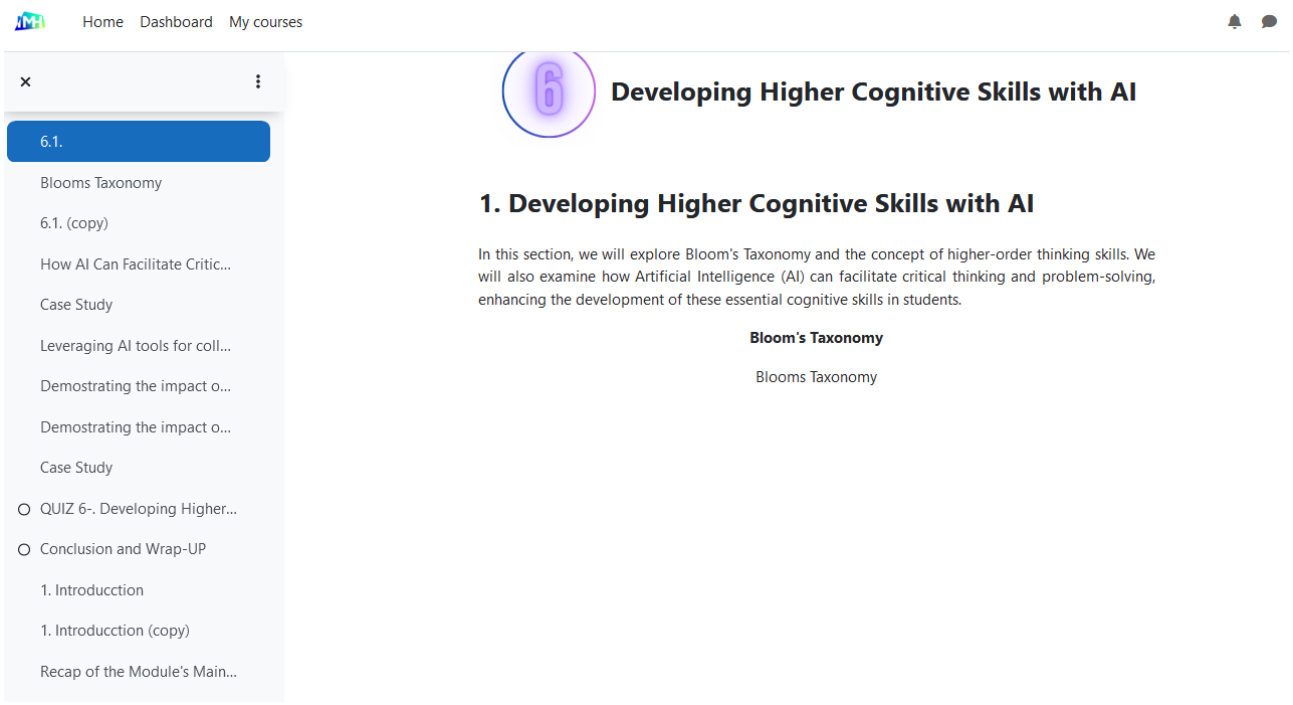
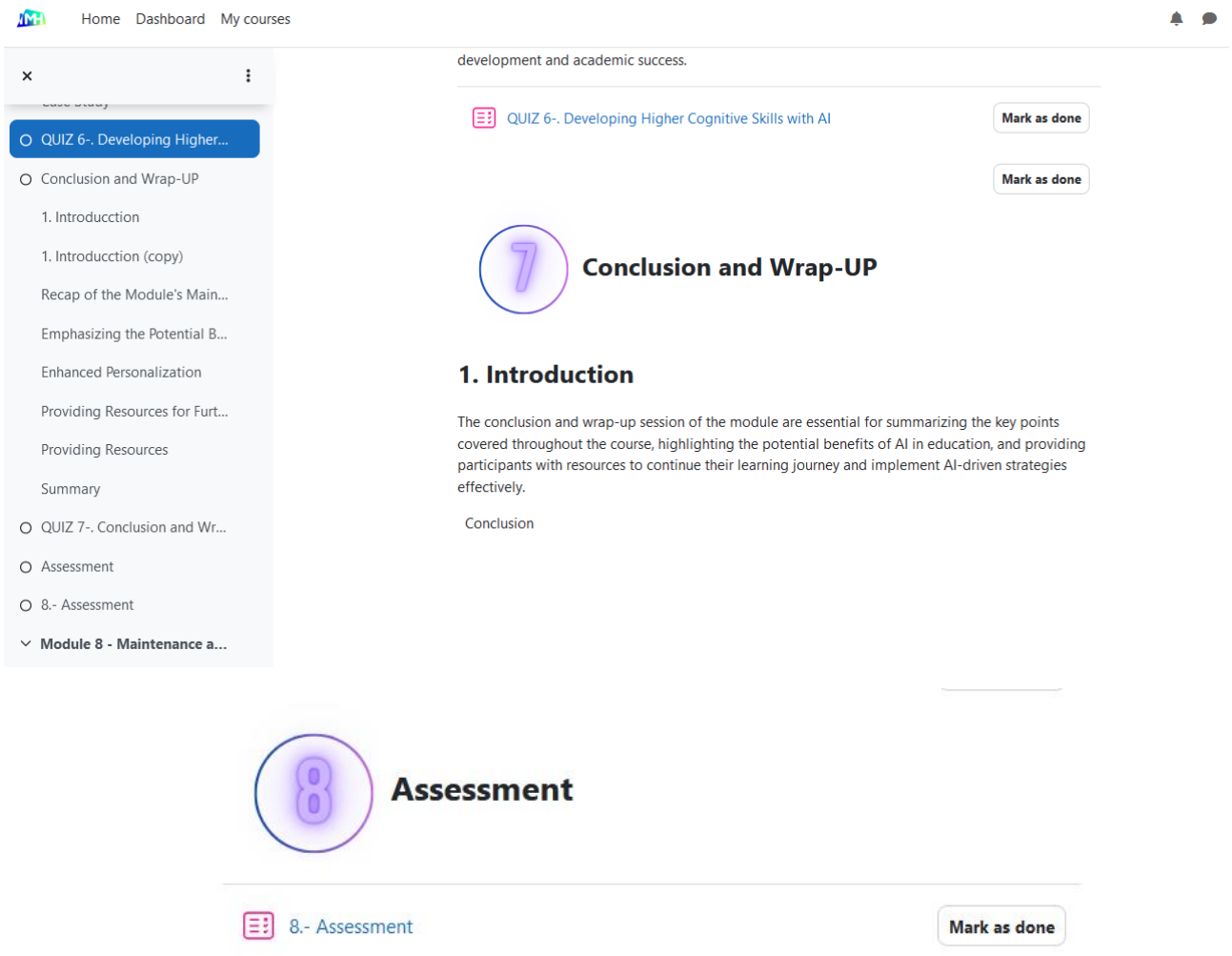
My courses
Designing AI-Enhanced Cou...
1.3. Data collection and ana...
Course Design Principles
Aligning Course Objectives ...
summary
Personalized Learning Paths
Examples of Adaptive Learn...
1.3.
How AI can support active l...
Gamification and interactiv...
Gamification
Gamification and interactiv...
3
Designing AI-Enhanced Courses
1. Designing AI-Enhanced Courses
In this section, we will explore the fundamental principles of effective course design, emphasizing the integration of AI-enhanced methods to create engaging and personalized learning experiences. Aligning course objectives with AI technologies can lead to more adaptive and successful educational outcomes.
new methods

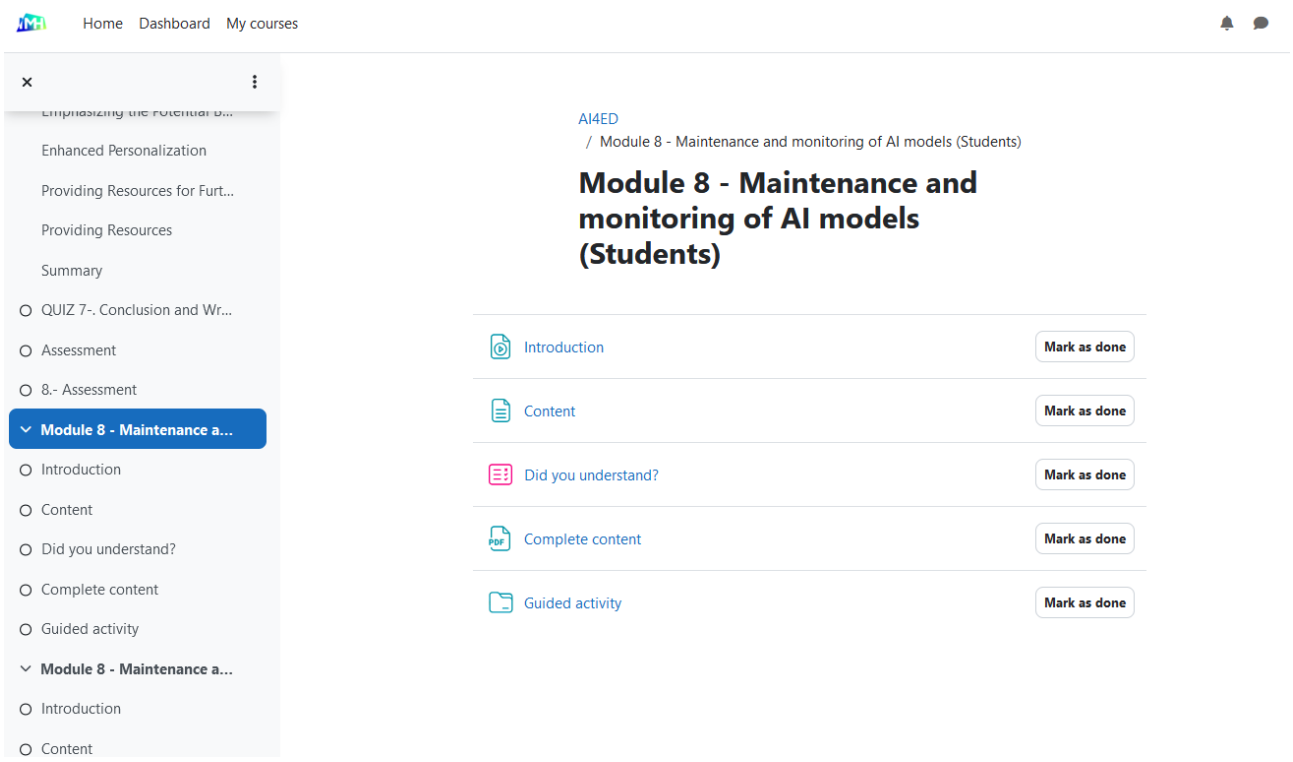

Home Dashboard My courses
1.4. Competences in Active ...
Collaborative learning
Case Study
PBL
Case Study - 2
Flipped Classroom
Case Study - 3
Think - Pair - Share
Case Study - 4
Jigsaw Technique
Case Study - 5
Case Study - Last
Promoting Student Engage...
Strategies
The Role of AI in Identifying...
Competences in Active Teaching Methods
In this section, we will conduct an in-depth exploration of various active learning methods and provide case studies illustrating successful implementations of active learning in diverse educational settings. Active learning goes beyond traditional lecture-style teaching, emphasizing student engagement, participation, and critical thinking.
1.1. Active Learning Techniques
Active learning encompasses a wide range of strategies and techniques that encourage students to take an active role in their learning. Here are some in-depth explorations of active learning methods:

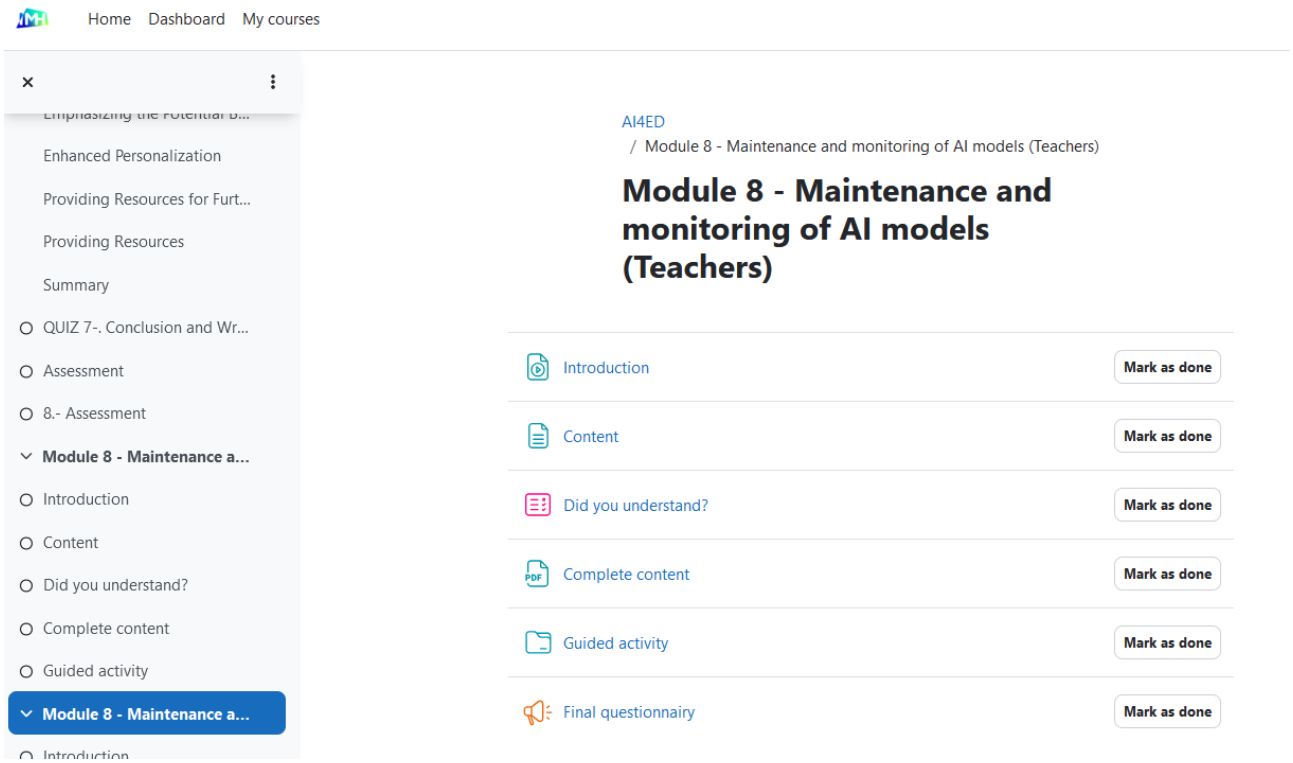

Home Dashboard My courses
5
AI-Powered Assessment an...
5.1 Examples
Examples of AI-Powered Gr...
Case Study
Implementinig AI Chatbots ...
Customizing tutoring based...
Customizing tutoring based...
Case Study
QUIZ 5-. Applying AI in Tea...
Developing Higher Cognitiv...
6.1.
Blooms Taxonomy
6.1. (copy)
Mark as done
Applying AI in Teaching Methods
1. Applying AI in Teaching Methods
In this section, we will explore how Artificial Intelligence (AI) can enhance assessment processes and provide instant feedback to students. We will also delve into examples of AI-powered grading systems that demonstrate the potential for AI in improving the assessment and feedback loop.
about feedback


Home
Dashboard
My courses
6.1.
Blooms Taxonomy
6.1. (copy)
How AI Can Facilitate Critic...
Case Study
Leveraging AI tools for coll...
Demostrating the impact o...
Demostrating the impact o...
Case Study
QUIZ 6-. Developing Higher...
Conclusion and Wrap-UP
1. Introducction
1. Introducction (copy)
Recap of the Module's Main...
6
Developing Higher Cognitive Skills with AI
1. Developing Higher Cognitive Skills with AI
In this section, we will explore Bloom's Taxonomy and the concept of higher-order thinking skills. We will also examine how Artificial Intelligence (AI) can facilitate critical thinking and problem-solving, enhancing the development of these essential cognitive skills in students.
Bloom's Taxonomy
Blooms Taxonomy


Home
Dashboard
My courses
QUIZ 6-. Developing Higher...
Conclusion and Wrap-UP
1. Introducction
1. Introducction (copy)
Recap of the Module's Main...
Emphasizing the Potential B...
Enhanced Personalization
Providing Resources for Furt...
Providing Resources
Summary
QUIZ 7-. Conclusion and Wr...
Assessment
8.- Assessment
Module 8 - Maintenance a...
development and academic success.
QUIZ 6-. Developing Higher Cognitive Skills with AI
Mark as done
Mark as done
7
Conclusion and Wrap-UP
1. Introduction
The conclusion and wrap-up session of the module are essential for summarizing the key points covered throughout the course, highlighting the potential benefits of AI in education, and providing participants with resources to continue their learning journey and implement AI-driven strategies effectively.
Conclusion
8
Assessment
8.- Assessment
Mark as done

Module 8 Overview:





5 Conclusions

The AI4ED Training Framework provides a structured and comprehensive approach to integrating artificial intelligence into educational systems. It addresses the needs of educators, students, and institutions by offering a combination of theoretical knowledge and practical applications. The program's modular design allows flexibility, enabling participants to engage with the content at their own pace while ensuring that they acquire the necessary skills to implement AI in education.

The framework emphasizes the ethical use of AI, with a strong focus on transparency, fairness, and compliance with data protection regulations such as GDPR. It ensures that participants understand the importance of responsible data management and ethical AI practices in educational contexts.

The program targets the development of key competencies, including digital literacy, data management, and problem-solving. These competencies align with established frameworks such as DigCompEdu, ensuring that participants are prepared to use AI effectively in their roles.

Sustainability is a core component of the framework. It encourages continuous learning and offers ongoing support through resources like the AI4ED toolkit, ensuring that participants can continue to develop their skills after completing the program.

Overall, the AI4ED Training Framework equips educational institutions and professionals with the tools and knowledge needed to integrate AI into teaching and learning processes, supporting long-term improvements in educational outcomes.