

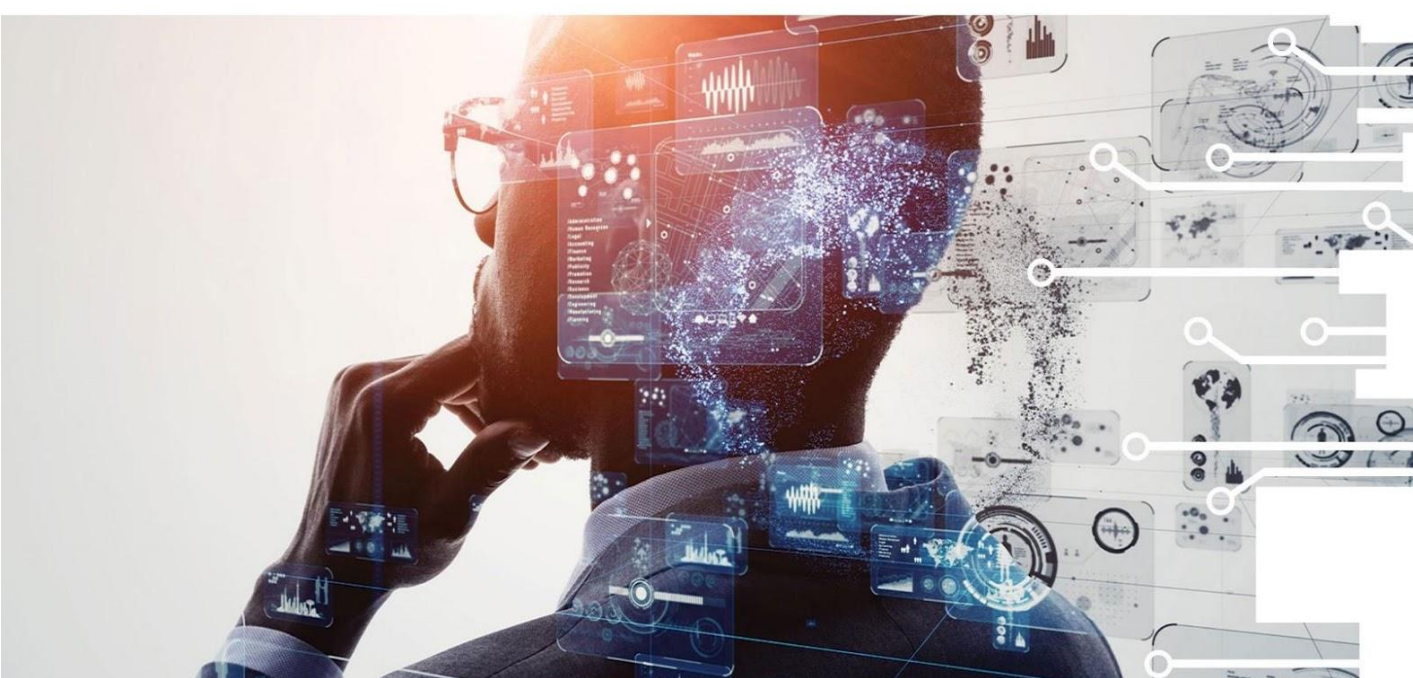


AI4VET4AI

AI-powered Next Generation of VET

Supporting Doctor - Patient Interactions with AI

IVET Teacher Training Materials



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Purpose of the document

This document supports IVET teachers in integrating the MOOC into their teaching practice. It provides pedagogical guidance, classroom implementation strategies, AI use cases relevant to vocational education, and ready-to-use activities. The materials are designed to support both classroom delivery and teacher self-study.

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Format: Pedagogical, practical, classroom-oriented, and self-study friendly.

1. Introduction to the MOOC and Its Relevance for IVET

Trainers

This MOOC shows trainers and students how Artificial Intelligence (AI) can be used in healthcare communication and clinical workflows. It focuses on tools such as chatbots, speech recognition, and generative AI, and how they can support doctor-patient conversations, reduce communication barriers, and improve medication adherence. The course is built around practical examples and explains both what multimodal AI models can do and which ethical rules are needed to use them safely.

AI is rapidly changing today's clinical environment. For future healthcare professionals, understanding how AI works and affects care is now essential. AI tools are increasingly used to handle routine administrative tasks, support diagnosis, and translate complex medical language into wording patients can understand. For IVET students in nursing, clinical pharmacy, medical administration, or allied health, basic AI skills are needed to work effectively, safely, and ethically with these technologies.

The curriculum links core technology concepts to everyday clinical practice. Students learn how to use AI-based platforms to keep in touch with patients outside the clinic, how to create simple visual explanations for people with low health literacy using generative AI, and how to use machine translation to address language barriers. The course also stresses ethics: students learn about data privacy (including GDPR), legal responsibility under the EU AI Act, and how to keep humans in control when using AI in professional settings. Real-world cases, such as managing “alert fatigue” or using predictive tools for medication management, help build critical thinking.

Because AI develops quickly, teaching these topics can seem overwhelming, especially for trainers without a strong technical background. This MOOC is designed specifically for IVET trainers and offers clear, structured material that turns complex ideas into concrete clinical examples. With ready-to-use resources—including knowledge checks, simple prompt engineering guides, and case studies on building patient trust—the course helps trainers introduce AI in the classroom and lead discussions confidently, without needing to be experts in software or coding.

2. Target Learners and Vocational Relevance

This MOOC is specifically tailored for students pursuing vocational and academic pathways in the healthcare and medical sectors. No prior technical knowledge of Artificial Intelligence or programming is required to succeed in this MOOC.

- **Basic digital literacy** is recommended to navigate the online tools and concepts discussed.
- **Foundational healthcare knowledge** is highly beneficial, including a basic understanding of doctor-patient communication goals, ethical principles, such as patient autonomy and confidentiality, and familiarity with standard clinical systems such as Electronic Health Records (EHRs).

The MOOC gradually introduces AI concepts using concrete examples and simple language, making it suitable for students with limited technical background. All activities focus on understanding and interpretation rather than programming or advanced mathematics.

The skills developed are directly relevant to typical vocational profiles, such as:

- **Medical and clinical students**
- **Nursing students**
- **Pharmacy students**
- **Healthcare administration and allied health students**

The skills developed in this MOOC directly translate to core vocational competencies:

In **Module 1** Students learn how AI-driven speech recognition and Natural Language Processing (NLP) can automate manual documentation, allowing practitioners to save time and focus on building rapport with, and treating, patients. They also learn how Clinical Decision Support Systems (CDSS) provide real-time, evidence-based recommendations to aid with diagnostic reasoning. In **Module 2** Students develop the ability to use Generative AI through strategic prompt engineering to create simplified, medically accurate visual diagrams, which helps patients with low health literacy understand complex procedures. Additionally, they learn how to appropriately deploy Machine Translation (MT) to bridge language and cultural gaps in low-risk clinical scenarios. In **Module 3** Learners acquire skills to support chronic disease management using AI-driven planning tools, predictive analytics, and conversational chatbots. Crucially, students are trained in ethical competence—learning how to maintain "human in the loop" oversight, manage clinical alerts to prevent "alert fatigue," and ensure compliance with data protection regulations such as the GDPR and the EU AI Act.

3. Learning Objectives and Competence Development

3.1 Learning outcomes

After completing the MOOC and selected classroom activities, students will be able to:

- **Explain** the primary goals of doctor-patient communication and how AI technologies can support or hinder these goals.
- **Identify** ethical principles, such as patient autonomy and confidentiality, and outline their corresponding legal frameworks such as the GDPR.
- **Describe** the core mechanisms behind AI-driven speech recognition and Natural Language Processing (NLP) in clinical documentation.
- **Analyse** how Clinical Decision Support Systems (CDSS) assist in diagnostic reasoning and evaluate their evidence-based design.
- **Identify** major categories of communication barriers in healthcare, including language, health literacy, and emotional obstacles.
- **Assess** and categorize the risk levels associated with different applications of Machine Translation (MT) in healthcare settings.
- **Apply** prompt engineering techniques to direct Generative AI in creating simplified, yet medically accurate visual diagrams.
- **Formulate** risk mitigation strategies for AI tools, such as maintaining human-in-the-loop oversight and using inclusive design.
- **Understand** the phases of medication adherence (initiation, implementation, discontinuation) and the consequences of non-adherence.
- **Analyse** patient-related, system-related, and condition-related barriers and facilitators to adherence.
- **Evaluate** AI tools used for medication support, including predictive modelling, conversational chatbots, and Automated Medication Reconciliation.
- **Develop** strategies to foster patient trust in medical AI through explainability, inclusive design, and professional oversight.

3.2 Competences developed

- **Vocational competences:** Understanding core medical ethics (autonomy, beneficence, non-maleficence, and justice) and applying AI in clinical practice, such as speech recognition for documentation and CDSS for structured recommendations. Supporting informed consent through plain-language communication, visual aids, and linguistically appropriate tools. Managing chronic disease treatments, recognizing non-adherence risks, and understanding Medication Therapy Management and automated medication reconciliation during hospital transfers.
- **Digital competences:** Differentiating between unimodal and multimodal generative AI models and understanding how system and user prompts guide AI behavior. Applying advanced prompt engineering with contextual information and safety constraints. Evaluating machine translation using frameworks such as MQM, using AI-driven medication planning integrated with EHRs, and reducing CDSS alert fatigue through AI-based warning filtering.
- **Transversal competences:** Developing critical thinking to identify AI hallucinations and maintain human oversight. Balancing cultural norms with medical needs, practicing empathy and inclusive design, and solving

problems through analysis of translation errors. Addressing digital disclosure and public stigma through workflow design, while communicating AI-supported decisions clearly to patients to strengthen trust in healthcare institutions.

3.3 Contribution to employability

Healthcare increasingly relies on digital tools to improve efficiency, reduce diagnostic uncertainty, and enhance patient care. Employers value professionals who can effectively use CDSS, patient engagement platforms, and AI while complying with legal and ethical requirements such as GDPR and the EU AI Act. With nearly half of European adults experiencing limited health literacy, AI-supported translation and accessible communication tools are essential for improving patient understanding and satisfaction. AI also enables proactive care through remote monitoring, educational chatbots, and predictive analytics, helping address medication non-adherence. Professionals who can critically assess AI-generated clinical alerts to reduce alert fatigue further contribute to safer, more efficient, and patient-centred healthcare.

A constructive alignment table is given in the Appendix A.

4. Overview of the MOOC Structure and Content

The MOOC is organised as a structured learning pathway that progresses from foundational knowledge of the doctor-patient-AI relationship and an introduction of the core AI tools that assist in clinical settings through addressing communication barriers to medical adherence. It consists of 3 modules, each with 3 units.

4.1 Modules

Module 1: Introduction to challenges in Doctor-Patient Interactions

Focus: This module establishes the foundational knowledge of the doctor-patient-AI relationship.

Approximate duration: ~25–30 hours

Module 2: Case Study 1: Communication Barriers

Focus: This module delves into specific communication hurdles, such as low health literacy and language differences, and demonstrates how AI technologies can be strategically applied to bridge these gaps and promote patient equity.

Approximate duration: ~25–30 hours

Module 3: Case Study 2: Medical Adherence

Focus: This module addresses the behavioural and systemic factors influencing patient medication compliance and evaluates how AI can be leveraged to monitor, predict, and support treatment plans while maintaining human trust.

Approximate duration: ~25–30 hours

The total estimated MOOC time is 125–150 hours. This includes the taught modules comprising video lectures, required pre-readings, interactive tutorials, and individual reflection work (3 ECTS / ~75–90 hours) and the capstone project (2 ECTS / 50–60 hours): which entails an individual, comprehensive project synthesizing the course material into a practical clinical workflow.

Level of difficulty: Beginner to Intermediate. Targeted at IVET students with basic digital literacy. Prior technical AI expertise is not required.

Units:

Each module is divided into three units that can be used as separate lesson blocks or combined into longer sessions:

- Module 1
 - Unit 1.1: Broad Issues in Doctor-Patient Interactions
 - Unit 1.2: Ethical Issues and Regulatory Compliance
 - Unit 1.3: Scope of AI Tools to Support Doctor-Patient Interactions
- Module 2
 - Unit 2.1: Overview of Communication challenges in Doctor-Patient Interactions
 - Unit 2.2: Language Barriers and Translating Instructions
 - Unit 2.3: Using Generative AI for Medical Procedure Image Generation
- Module 3
 - Unit 3.1: Overview of challenges with medical adherence
 - Unit 3.2: AI Applications for Medication Support and Planning
 - Unit 3.3: Fostering Trust in Medical AI

5. Key AI Concepts and Medical Terminology explained for teachers

To support confident classroom delivery, this section explains key AI concepts in simple, non-technical language. The aim is to help teachers understand the basics and feel comfortable explaining them to students using relatable examples from the medical field.

5.1 Machine Learning (ML) and Predictive Analytics

Plain-language definition: Machine learning is the capability of a computational system to learn from data and generalize to unseen data without being explicitly programmed to do so. Predictive analytics uses this learning to estimate and forecast possible future outcomes.

Simple explanation and analogy: Imagine a meteorologist studying decades of weather patterns to predict whether it will rain tomorrow. Machine learning does this with data, looking for hidden patterns to guess what will happen next.

Real-world vocational example: An AI system identifying a pattern where a patient frequently misses medication doses on weekends.

Relevance to the sector: Predictive analytics allows healthcare providers to identify patients at a high risk of medical non-adherence before it happens, shifting care from a reactive approach to a proactive, preventative one.

5.2 Generative AI (GenAI)

Plain-language definition: A subset of artificial intelligence that uses generative models to produce entirely new content, such as text, images, videos, or other forms of data based on user instructions.

Simple explanation and analogy: Think of GenAI as an incredibly well-read digital assistant. If you describe exactly what you want—like asking an artist to paint a specific scene—it will generate a brand new piece of text or an image matching your description.

Real-world vocational example: Using a tool such as DALL-E to generate a simplified, non-scary visual diagram of a gallbladder removal procedure for a patient brochure.

Relevance to the sector: GenAI serves as a vital communication bridge, converting highly technical medical terminology into plain-language visual diagrams to support patients with low health literacy.

5.3 Unimodal vs. Multimodal Models

Plain-language definition: Unimodal models process and return data in only one format (e.g., text-in, text-out). Multimodal models can receive input in several formats (e.g., images or audio) and return outputs in another format (such as text).

Simple explanation and analogy: A unimodal model is like a standard radio—it only deals with audio. A multimodal model is like a television or smartphone, capable of processing audio, video, and text simultaneously.

Real-world vocational example: A doctor feeding an X-ray image into an AI tool and asking it to provide a text description of the anomalies found.

Relevance to the sector: Multimodal capabilities allow clinicians to blend patient health records (text) with anatomical requests to generate customized medical diagrams (images), greatly enhancing patient education.

5.4 Chatbots (Conversational Agents)

Plain-language definition: AI systems designed to interact with users via text or voice, available 24/7 and capable of scaling at the cloud level.

Simple explanation and analogy: It is like an always-open digital front desk that never sleeps, ready to answer questions or provide guidance at any hour.

Real-world vocational example: A patient experiencing mild side effects at 2 AM using an AI app to ask if they should delay their morning medication.

Relevance to the sector: Chatbots alleviate healthcare system burdens by handling routine inquiries, triaging symptoms, and providing instant educational support to patients, which has been shown to boost medical adherence by over 20%.

5.5 Hallucinations and the "Black Box" Problem

Plain-language definition: AI systems are often called "black boxes" because their internal decision-making processes are hidden and not easily interpreted by users. Hallucinations occur when an AI lies confidently, producing realistic but entirely incorrect information.

Simple explanation and analogy: Imagine a student taking a math test. They write down a highly detailed, confident answer, but refuse to show their work (the Black Box). Upon closer inspection, the math is entirely made up (a hallucination).

Real-world vocational example: An AI generating an anatomical diagram of a heart bypass that looks incredibly professional but places the blood vessels in medically impossible locations.

Relevance to the sector: Because of these risks, teachers must emphasize the "Human-in-the-Loop" (HITL) concept. Clinicians must act as empathetic guardians who validate all AI outputs to ensure patient safety and maintain trust.

Together, these concepts provide a foundation for understanding how AI supports decision-making in market research contexts.

For teachers who are new to AI concepts, the following resources provide clear and accessible introductions:

- [Elements of AI](#) – a free introductory course explaining AI basics in simple terms
- [Google AI](#) – beginner-friendly explanations and examples of AI applications
- [IBM SkillsBuild](#) – practical courses and materials for understanding AI in business contexts
- [Coursera](#) – introductory courses on AI and data analysis

5.6 Key Medical Terminology and Acronyms

To confidently teach this MOOC, trainers should also be familiar with the specialized medical and regulatory terminology used throughout the course:

- **CDSS (Clinical Decision Support Systems):** AI-enabled tools that analyze large datasets—such as patient histories and clinical guidelines—to provide doctors with evidence-based recommendations for diagnosis and treatment.
- **NLP (Natural Language Processing):** A technology that processes human speech and text. In clinical settings, NLP transcribes spoken doctor-patient interactions into structured medical notes in real-time.

- **EHR (Electronic Health Records):** Digital versions of a patient's medical history. AI tools often integrate directly with EHRs to provide automated medication schedules or flag dangerous drug combinations.
- **MTM (Medication Therapy Management):** A service where clinicians review a patient's medication regimen to optimize outcomes. Large language models are now used to support MTM by identifying drug-drug interactions automatically.
- **Health Literacy:** The ability to access, understand, and use health information effectively. This is a major focus of the MOOC, as nearly 47% of adults in Europe have inadequate health literacy, impeding their care.
- **Medical Adherence (Initiation, Implementation, Discontinuation):** The extent to which a patient follows agreed-upon medical recommendations. The MOOC covers *Primary non-adherence* (never starting a medication) and *Secondary non-adherence* (not taking the medication as prescribed).
- **MQM (Multidimensional Quality Metrics):** A framework used to evaluate translation accuracy. It helps categorize Machine Translation (MT) errors into specific types, such as mistranslation, overtranslation, and undertranslation.
- **Alert Fatigue:** A safety concern where doctors are overwhelmed by a massive volume of irrelevant digital warnings in a hospital, causing them to override or ignore critical alerts. AI is used to filter these alerts to reduce fatigue.
- **GDPR (General Data Protection Regulation) & EU AI Act:** Crucial European regulatory frameworks. The GDPR imposes strict requirements on processing sensitive health data, while the EU AI Act establishes legal accountability, ensuring clinicians remain responsible for AI-assisted decisions.
- **Recommended external resources for teachers new to AI concepts**

6. Pedagogical guidance for classroom implementation

6.1 Implementation Approaches

Full MOOC Integration

- **Application:** Teachers can deploy the full curriculum as a comprehensive 5 ECTS vocational course spanning approximately 125–150 hours of total workload.
- **Structure:** Students spend 75–90 hours systematically progressing through the three core instructional modules, mastering communication theory, machine translation, and medication safety applications sequentially. The final 50–60 hours are dedicated to the execution of the individual Problem-Based Learning (PBL) Capstone Project.
- **Benefit:** This approach builds holistic competence, taking students from basic AI and clinical literacy to advanced workflow architecture and ethical auditing.

Partial MOOC Integration

- **Application:** Trainers can extract specific modules or units to enrich pre-existing vocational pathways.
- **Medical Administration Tracks:** Instructors can extract *Module 2: Case Study 1: Communication Barriers* to train students in handling language discordance. Lessons focus on evaluating Machine Translation (MT) software using the Multidimensional Quality Metrics (MQM) framework to flag mistranslations, overtranslations, and omissions before documents reach outpatients.
- **Clinical Pharmacy Tracks:** Instructors can integrate *Module 3: Case Study 2: Medical Adherence* exclusively to teach modern Medication Therapy Management (MTM) and Automated Medication Reconciliation. Students explore how large language models identify drug-drug interactions with high accuracy but fail to recommend specific dosages, highlighting the necessity of human clinical judgment.

Project-Based MOOC Integration

- **Application:** The classroom can be entirely structured around the execution of the capstone project outlined in "[AI4VET4AI_AI Doctor-Patient Interaction_PBL task.docx](#)".
- **Structure:** Instead of traditional lecturing, classroom sessions serve as interactive milestones for the project's six phases. Students select a concrete vocational scenario—such as an elderly hypertension clinic or a multilingual emergency room—and spend class time constructing a visual Patient Journey Map.
- **Benefit:** Theoretical content from the units is directly pulled by the student as needed to justify their technical choices and pass the ethical audit phases of their project report.

6.2 Teaching Recommendations

To support effective learning, teachers are encouraged to

- **Combine MOOC Learning with Classroom Discussion**

Trainers should utilize a flipped classroom model where students review technical overviews individually before engaging in collaborative debates. For example, after students complete the online reading on Speech Recognition and NLP digital scribes, the instructor may facilitate a classroom discussion on workflow trade-offs. Students can debate how freeing a clinician from manual note-taking improves patient eye contact and rapport, balanced against the systemic risks of transcription errors in noisy hospital wards or when interacting with patients who have speech impairments.

- **Facilitate Reflection**

Instructors can use the built-in ethical dilemmas to cultivate critical thinking and professional responsibility. Teachers can present the clinical governance scenario where an elderly heart failure patient's monitoring app confidently suggests delaying a dose due to mild side effects. Students could be tasked with drafting a 150–200 words argumentative text defending their policy response regarding AI autonomy versus clinician oversight. Reflection can be deepened by analyzing high-stigma conditions, such as HIV, where standard medication reminder apps risk accidental disclosure. Instructors can challenge students to brainstorm how "forgetting or obscuring" data mechanisms can protect a vulnerable patient's privacy and narrative control.

- **Connecting Content to Vocational Practice**

All classroom tasks should be anchored to real-world data and hands-on tool manipulation to emphasize workplace utility. Trainers should introduce the core statistic that 27% of medical malpractice cases involve communication failures to demonstrate the high stakes of their training. Instructors should run practical workshops based on "**Generative AI for Medical Procedure Image Generation.docx**". Students actively practice prompt engineering using a 5-step model (Core Action, Context, Jargon Simplification, Visual Structure, and Safety Constraints) to translate intimidating terms such as "laparoscopic cholecystectomy" into simplified plain-language visuals for the 47% of European adults suffering from low health literacy.

6.3 Example of Good Practice

The following example illustrates how teachers have used the materials in an IVET setting.

- **A Regional Vocational Education and Training (VET) Academy**

Project-based integration focused on a multilingual maternity ward case study using the "**AI4VET4AI_AI Doctor-Patient Interaction_PBL task.docx**" framework. What worked well: Integrating two mandatory 15-minute instructor "check-ins" during the literature review and workflow design phases ensured students selected realistic, non-automated boundaries. Utilizing accessible image generation tools in the lab allowed students to see how lowering an AI's creativity setting maintains strict anatomical accuracy required for safe patient education.

7. AI Use Cases for IVET classroom implementation

7.1 Module 1: Introduction to Challenges in Doctor-Patient Interactions

Use Case 1: The AI Digital Scribe (Speech Recognition and NLP)

- **Description:** An AI-driven digital scribe captures spoken language between a clinician and a patient during a live consultation. It translates unstructured speech into structured medical documentation in real-time, integrating directly with Electronic Health Records (EHRs). This reduces manual documentation and allows the practitioner to focus on building rapport.
- **Trainer Guidance:** Set up a live roleplay scenario where one student plays a practitioner and another acts as a complex patient with multiple symptoms. Have the "practitioner" conduct the interview under two conditions: first, using traditional manual keyboard note-taking, and second, simulating an active AI digital scribe where they maintain full eye contact and verbal engagement.
- **Discussion Questions:**
 - How does removing manual keyboard entry affect the primary communication goals of building a relationship and exchanging information?
 - What are the safety and legal risks if an NLP tool processes speech in a noisy environment or misinterprets a patient with a severe speech impairment or a strong accent?
 - Why must a "human-in-the-loop" validation step be enforced before the AI-generated transcription is officially saved to a patient record?

7.2 Module 2: Case Study 1: Communication Barriers

Breaking Down the Use Case: Module 2 highlights how generalized communication barriers can be broken down into specific operational aspects. Specifically, this is achieved by differentiating between **written machine translation safety thresholds** and **the prompt engineering mechanics of visual medical simplification**.

Use Case 2A: Risk Assessment and Sorting of Machine Translation Tiers

- **Description:** Hospital administrative staff must evaluate and deploy automated Machine Translation (MT) services to assist non-native speakers. Rather than using a single automated solution, the team must categorize clinical translation tasks based on safety and accuracy risks.
- **Trainer Guidance:** Provide students with a list of historical hospital communication scenarios, such as outpatient orientation flyers, patient arrival directions, legal surgery consent forms, and real-time emergency verbal instructions. Have students use the Multidimensional Quality Metrics (MQM) framework to sort these items into "High-Risk" and "Low-Risk" translation categories.
- **Discussion Questions:**

- Why are written outpatient arrival notices considered low-risk, while real-time speech-to-speech translation tools are categorized as high-risk?
- How can a specific MQM error, such as an "omission" or a "mistranslation," directly impact a patient's physical safety during self-care?
- How does an overreliance on unverified commercial translation tools damage patient trust and satisfy the statistic that 27% of malpractice cases involve communication failures?

Use Case 2B: Visual Jargon Translation via Generative AI Prompt Engineering

- **Description:** A medical assistant must explain a "laparoscopic cholecystectomy" (gallbladder removal) to a patient with low health literacy. Since nearly 47% of European adults struggle with inadequate health literacy, the assistant uses a multimodal generative AI tool to create a simplified, plain-language anatomical diagram.
- **Trainer Guidance:** Instruct students to use the 5-step prompt engineering model (defining core action, adding anatomical context, simplifying jargon, structuring layout, and defining safety boundaries). Students must write a precise user prompt that commands the AI to output a medically accurate, non-scary layout replacing terms like "occlusion" with "blockage".
- **Discussion Questions:**
 - How does transforming complex jargon into a personalized visual aid support the ethical principle of patient autonomy and informed consent?
 - Why must the model's creativity setting be set to low when generating medical procedure images compared to general self-help images?
 - Under the EU AI Act, who holds legal accountability if an AI-generated procedure image contains a structural hallucination that misleads a patient?

7.3 Module 3: Case Study 2: Medical Adherence

Breaking Down the Use Case: Module 3 addresses medical non-adherence by breaking the issue into distinct clinical environments. This is achieved by separating **outpatient chronic behavior tracking via mobile chatbots** from **inpatient medication safety and system-level alert optimization**.

Use Case 3A: AI Chatbot Interventions for Stigma-Coping Chronic Adherence

- **Description:** An outpatient diagnosed with a chronic or high-stigma condition (such as hypertension or HIV) is paired with an AI-driven conversational chatbot to track daily medication consumption. The system tracks behavior, provides 24/7 educational advice, and logs ingestion data using predictive modeling.
- **Trainer Guidance:** Present students with a scenario where an elderly patient's mobile app identifies a pattern of missed doses on weekends and suggests delaying a dose due to mild side effects. Have students analyze the technical and ethical boundaries of this system, specifically focusing on data privacy and the integration of data-obscuring "forgetting" mechanisms.
- **Discussion Questions:**

- How can an educational chatbot boost long-term chronic treatment adherence by more than 20% compared to a simple, un-tailored alarm clock reminder?
- What social and psychological anxieties do patients face regarding accidental disclosure, and how can app designers mitigate this through data-obscuring mechanisms?
- What level of autonomy should a patient-facing chatbot have before its recommendations cross from administrative support into unauthorized medical suggestions?

7.4 Use Case 3B: Automated Medication Reconciliation and Alert Optimization

- **Description:** During an inpatient transfer between hospital wards, a clinical assistant utilizes an AI-powered Clinical Decision Support System (CDSS) to perform automated medication reconciliation. The machine learning model reviews the patient's complete history, flags drug-drug interactions (DDIs), and suppresses irrelevant warnings to combat clinician "alert fatigue".
- **Trainer Guidance:** Present a complex clinical case file to the class. Inform the students that while large language models such as ChatGPT 4.0 can accurately identify drug interactions across complex cases with 100% accuracy, they frequently fail to recommend specific drug dosages. Have students map out the workflow for cross-checking the AI alerts.
- **Discussion Questions:**
 - Why do hospital practitioners override up to 96% of traditional digital alerts, and how does machine learning reduce this burden to prevent safety oversights?
 - If an AI system successfully decreases the alert burden by 14% to 90%, how does this directly improve patient safety and hospital workflow efficiency?
 - Given that AI can identify a drug contradiction but struggles with specific dosing, what exact role does human clinical judgment play in this automated environment?

8. Classroom Activities and Practical Exercises

8.1 Activity 1: The AI "Black Box" Tripartite Roleplay

- **Objective:** Analyze how introducing AI transforms the traditional doctor-patient dyad into a tripartite relationship, and practice identifying conversational "hallucinations".
- **Description:** Students work in triads to simulate a real clinical consultation mediated by a chatbot interface. They experience firsthand the friction of opaque AI decision-making (the "black box") and the necessity of keeping a human in the loop.
- **Instructions for Teachers:**
 - Divide students into groups of three and assign roles: Doctor, Patient, and AI Chatbot.
 - Provide the "Patient" with a secret script containing symptoms and emotional anxieties (e.g., fear of side effects).
 - Provide the "AI Chatbot" with a text-based medical guide that contains one hidden, confidently written error (a simulated hallucination).
 - Run a 10-minute consultation where the Doctor must interview the patient but can *only* formulate treatment plans by querying the "AI Chatbot" speaker.
 - Bring the class together to debrief where the communication broke down and whether the doctor caught the AI's lie.
- **Duration and Group Size:** 45 minutes | Groups of 3.
- **Expected Learning Outcomes:** Ability to explain how AI can hinder or support relationship building, and demonstrate critical verification strategies to handle untrustworthy AI outputs.
- **Adaptation Tips for Different Student Profiles:**
 - *IVET (Entry-level):* Focus on basic conversational flow and simple chatbot limitations.
 - *IVET (Upskilling professionals):* Focus heavily on professional liability under the EU AI Act and maintaining eye contact while using real-time electronic note-taking scribes.

8.2 Activity 2: The MQM Translation Risk Audit

- **Objective:** Evaluate the accuracy of automated medical translations using the Multidimensional Quality Metrics (MQM) framework.
- **Description:** Students act as a clinical quality assurance board. They review raw machine translation (MT) outputs of outpatient discharge instructions and classify errors to determine if the text is safe for distribution.
- **Instructions for Teachers:**

1. Distribute a handout featuring medical instructions that have been intentionally modified with classic MQM errors (e.g., an *omission* of a dosage warning, an *undertranslation* of a specialist doctor type, or a *mistranslation* reversing a negative instruction).
 2. Provide students with the MQM framework definitions.
 3. Task groups with highlighting and categorizing every translation discrepancy they find.
 4. Have each group vote on whether the document presents a "High-Risk" or "Low-Risk" threat to patient safety.
- **Duration and Group Size:** 60 minutes | Groups of 4.
 - **Expected Learning Outcomes:** Competence in identifying specific translation error categories (mistranslation, omission, addition) and grading clinical safety risks associated with unverified automation.
 - **Adaptation Tips for Different Student Profiles:**
 - *Medical Administrative Assistants:* Emphasize the logistical and financial costs of utilizing poor translation data versus professional interpreter services.

8.3 Activity 3: Visual Prescription: Medical Prompt Engineering Workshop

- **Objective:** Apply a structured 5-step prompt engineering model to generate patient-centered, plain-language visual aids using generative AI.
- **Description:** Students translate complex, intimidating clinical medical jargon into highly accessible user prompts designed to generate anatomical illustrations for patients with low health literacy.
- **Instructions for Teachers:**
 1. Present the class with a highly technical, jargon-heavy case snippet (e.g., "Laparoscopic cholecystectomy featuring an acute cystic duct occlusion").
 2. Introduce the 5-step prompt engineering blueprint: 1) Define core clinical action, 2) Enrich with patient context, 3) Simplify jargon, 4) Specify layout structure, and 5) Set strict scientific safety boundaries (low creativity).
 3. Instruct students to individually draft a complete "system prompt" and "user prompt" matching these steps.
 4. If computers are available, let them run the prompts in an authorized image generator; if not, have peers audit the text prompts against the checklist to see if terms like "occlusion" were successfully replaced with plain language like "blockage".
- **Duration and Group Size:** 60 minutes | Individual or Pairs.

- **Expected Learning Outcomes:** Mastery of system and user prompt separation, and practical skills in bridging health literacy gaps for the 47% of adults in Europe with problematic comprehension.
- **Adaptation Tips for Different Student Profiles:**
 - *Tech-Anxious Learners:* Provide pre-baked sentence frames for the 5 steps so they can focus on jargon translation rather than writing raw software formatting commands from scratch.

8.4 Activity 4: The Alert Fatigue Filter Challenge

- **Objective:** Analyze the clinical impact of "alert fatigue" within hospital settings and evaluate how machine learning optimizes decision support software.
- **Description:** Students examine simulated logs from a hospital Clinical Decision Support System (CDSS) to understand why doctors override up to 96% of digital alerts and how AI can filter out irrelevant warnings.
- **Instructions for Teachers:**
 1. Hand out a list of 10 consecutive drug-safety pop-up alerts generated by a traditional hospital computer system during patient transfers.
 2. Provide brief patient profiles (age, current medications, specific lab values).
 3. Task the students with acting as the "AI logic layer"—they must cross-reference the profiles and decide which warnings are clinically critical and which ones are irrelevant noise causing fatigue.
 4. Reveal that an optimized AI method can reduce this alert burden by 14% to 90%, and discuss how this preserves human clinical judgment.
- **Duration and Group Size:** 45 minutes | Groups of 3 to 5.
- **Expected Learning Outcomes:** Deep understanding of CDSS functionality, the mechanisms behind alert fatigue, and the ongoing necessity of human clinical oversight for dosage recommendations.
- **Adaptation Tips for Different Student Profiles:**
 - *Pharmacy Students:* Increase the clinical complexity by introducing subtle drug-drug interactions (DDIs) and multi-morbidity profiles.

8.5 Activity 5: Designing for Discretion: Stigma-Coping Workshop

- **Objective:** Synthesize WHO medication adherence barriers with digital privacy solutions to support vulnerable populations managing high-stigma conditions.
- **Description:** Students engage in a design-thinking exercise to modify a standard medication reminder app into a secure tool that prevents accidental public disclosure and social rejection for patients with conditions like HIV or severe hypertension.

- **Instructions for Teachers:**

1. Present the research case study: Patients frequently skip medication doses in public settings out of acute fear of social stigma, discrimination, or violence if an app alert pops up on their screen.
2. Challenge students to move beyond "medication-only alerts" and design user interface (UI) solutions centered on "stigma-coping".
3. Instruct groups to draft a workflow on a whiteboard illustrating at least two discrete safety features, such as matching patients with blind peer mentors or implementing data-obscuring "forgetting" mechanisms that wipe sensitive information after a set period.
4. Groups present their privacy-preserving workflows to the class for ethical critiquing.

- **Duration and Group Size:** 50 minutes | Groups of 3 to 4.

- **Expected Learning Outcomes:** Competence in identifying social and cultural adherence barriers and applying ethical data principles to digital patient care layouts.

- **Adaptation Tips for Different Student Profiles:**

- *IVET Practitioners:* Have them directly cross-reference their designs against their own clinic's real-world GDPR and data encryption compliance standards.

8.6 Activity 6: Clinical Patient Journey Mapping (Capstone PBL Prep)

- **Objective:** Design a fully integrated, multi-tool clinical workflow diagram that details precise doctor-AI-patient touchpoints across the entire care cycle.
- **Description:** Serving as a preparatory boot camp for the official 2,000-word Capstone Project, students map out an end-to-end patient care sequence using large-format flipcharts.

- **Instructions for Teachers:**

1. Assign each group one core clinical scenario from the project brief (e.g., Scenario A: Elderly hypertension clinic; Scenario B: Multilingual maternity ward; Scenario C: High-complexity surgical unit).
2. Instruct students to draw a timeline divided into three clear operational stages: Pre-Consultation, During Consultation, and Post-Consultation (Adherence).
3. Students must embed at least two distinct AI applications (e.g., NLP digital scribes and predictive tracking apps) into the timeline.
4. Crucially, they must mark distinct "Human-in-the-Loop Verification Touchpoints" using red stickers to show exactly where a clinician must sign off on data accuracy.

- **Duration and Group Size:** 90 minutes | Groups of 2 or 3 (or executed individually for direct Capstone portfolio preparation).
- **Expected Learning Outcomes:** Technical capability to synthesize multi-tool clinical designs, visually map complex workflows, and establish strict clinical safety boundaries.
- **Adaptation Tips for Different Student Profiles:**
 - *Pacing Tip:* This activity directly outputs Phase 4 of the mandatory PDF portfolio assignment, significantly decreasing student text-writing anxiety by establishing their visual structure early.

9. Assessment and Evaluation Validation

9.1 Examples of assessment methods

Quizzes (Evaluating Foundational Understanding)

- Quizzes in this course are designed to measure a student's understanding of clinical communication workflows, ethical parameters, and the structural limitations of AI, entirely eliminating technical coding or programming complexity.

Diverse Student Assignments (Evaluating Application)

- **Individual Assignment: The Clinical Governance Policy Memo**
- **Task Description:** Students write a short, 150-to-200-word argumentative reflection based on a real-world digital health dilemma.
- **Scenario:** An elderly outpatient's heart failure monitoring app confidently instructs them to delay their morning medication dose due to mild overnight side effects. The patient feels reassured, but the caregiver is highly concerned that the AI is acting beyond its authorized clinical competence.
- **Assessment Criteria:**
 - **Policy Justification:** Clearly defends a specific operational boundary (e.g., enforcing mandatory symptom severity flags or limiting the AI's scope to administrative alerts).
 - **Ethical Grounding:** Accurately applies bioethical pillars, ensuring that patient safety (non-maleficence) and informed choices (autonomy) are structurally balanced.
 - **Role of the Mediator:** Correctly identifies where professional clinical accountability falls when automated guidance impacts patient treatment.

Group Work & Class Presentation: Jargon Visual Translation Campaign

- **Task Description:** Working in teams of three, vocational students select an intimidating medical procedure (e.g., a laparoscopic cholecystectomy) and build a patient-facing educational brief using multimodal generative AI principles.
- **Assignment Deliverables:**
 - A documented system and user prompt engineered using the 5-step model (Core Action, Patient Context, Jargon Simplification, Visual Structure, and Safety Boundaries).
 - A brief 10-minute presentation displaying their generated plain-language visual aid alongside an explanation of how it serves the 47% of European adults suffering from problematic health literacy.
- **Assessment Criteria:**

- **Jargon Elimination:** Success in instructing the AI to replace high-level terminology with clear layout definitions (e.g., transforming "occlusion" to "blockage").
- **Bias and Inclusive Design:** Clear justification of how the team checked their training dataset parameters to prevent age, racial, or gender disparities in the output visuals.
- **Presentation Clarity:** Communicating technical choice arguments in highly accessible, human-centered language.

The Capstone Project (Comprehensive Evaluation)

- The primary assessment vehicle for this course is the individual Problem-Based Learning (PBL) Capstone Project: *Optimising Doctor-Patient Interaction through AI-Mediated Communication*. Worth 2 ECTS (representing 50–60 hours of workload), it demands the synthesis of technical, operational, and ethical course concepts into a practical implementation framework.
- **Format Requirement:** A single PDF portfolio containing a formal 2,000-word (+/- 10%) written report, a visual patient journey diagram, and an annotated bibliography.
- **Core Task:** Students assume the role of a "Clinical AI Integration Specialist". They select a distinct healthcare setting (such as a clinic managing elderly hypertension, or a multilingual maternity ward) and architect an end-to-end communication strategy. The workflow must successfully utilize at least two distinct AI tools (e.g., NLP scribes, chatbots, or generative illustration software) while explicitly embedding mandatory clinical verification touchpoints.
- **Assessment Rubric (Focused on Application & Ethics)**
- The following rubric is used to evaluate the 2,000-word capstone report and its accompanying interaction diagram, prioritizing clinical logic, safety mapping, and regulatory alignment over code-level complexity:

Table 1 Assessment Rubric for the AI-Enhanced Clinical Communication Report

Criterion	Weight	Excellent (Pass with Distinction)	Satisfactory (Pass)	Unsatisfactory (Fail)
Problem Analysis & Context	20%	Deep, evidence-based analysis of specific clinical communication barriers that goes well beyond the standard course text. Seamlessly contextualizes clinical safety risks and historical malpractice data.	Clear, accurate identification of at least three distinct communication gaps within the chosen clinical scenario, appropriately supported by the course readings.	Vague, generic, or overly broad description of the medical setting. Fails to identify distinct communication failures or back them up with context data.
AI Solution Design	25%	Highly innovative, realistic integration of multiple AI applications (e.g., NLP scribes combined with generative visuals). Provides flawless logic explaining how each tool targets and fixes the identified workflow friction.	Appropriate selection of at least two AI technologies that logically align with and solve the specific clinical barriers identified in the scenario analysis.	AI tools are poorly chosen, unrealistic for a standard clinic environment, or lack logical justification regarding patient benefit.
Workflow & Human-in-the-Loop	20%	Exceptionally detailed Patient Journey Map spanning pre-, during-, and post-consultation stages. Precise doctor-AI-patient touchpoints with highly explicit clinical validation boundaries.	A logical visual workflow diagram illustrating a functional sequence of AI-supported interactions across care stages, maintaining human oversight check-points.	The visual mapping is disorganized or confusing. Features missing human oversight points or describes a fully automated system that removes professional mediation.
Ethics, Regulation & Trust Audit	20%	Sophisticated, multi-layered audit explicitly tackling the "black box" problem, algorithmic bias, data privacy, and strict legal accountability under the GDPR and the EU AI Act.	Clear, competent discussion of patient privacy, data security boundaries, and basic mitigation strategies to ensure the tool upholds patient autonomy and consent.	Minimal or entirely missing ethical reflections. Fails to address data privacy laws, algorithmic biases, or who carries liability when an automated tool fails.
Professionalism & Structure	15%	2,000 words of exceptional, institutional-standard professional writing.	Well-structured, coherent report that successfully meets the 2,000-word requirement (+/- 10%) and utilizes the	Poorly organized structure, severe grammatical errors, or significantly under the required word count. Fails to meet the

		Includes a flawlessly formatted annotated bibliography exceeding the required source minimums.	mandatory layout components (Executive Summary, Technical Design, etc.).	basic standards of a professional report.
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10. Integrating the MOOC into IVET curricula

10.1 Connecting the MOOC to specific vocational courses

While this MOOC is explicitly designed around doctor-patient interactions, its core lessons on AI integration, communication, and digital ethics are highly transferable across multiple Initial Vocational Education and Training (IVET) pathways.

- **Healthcare training:** This is the most direct application. The MOOC trains future nurses, medical assistants, and pharmacists to use AI-driven tools such as Clinical Decision Support Systems (CDSS), medication adherence trackers, and automated scribes to improve patient outcomes and workflow efficiency.
- **IT and Health-Informatics courses:** IT students can study the MOOC to understand the technical deployment of AI in highly regulated environments. They can focus on the architectural concepts of integrating AI planning tools with Electronic Health Records (EHRs), managing multimodal generative AI models, and mitigating the risks of algorithmic bias and "hallucinations".
- **Business and Healthcare Administration courses:** Students learning clinical governance or medical management can utilize the MOOC to understand resource optimization. They will learn how AI can alleviate systemic time constraints, decrease hospital "alert fatigue" by 14% to 90%, and manage the liability and policy implications of the EU AI Act and GDPR.
- **Tourism and Hospitality training (Medical Tourism):** For students entering medical tourism or international patient coordination, the MOOC's module on overcoming communication and language barriers is highly relevant. Students can learn how to apply Machine Translation (MT) safely and use frameworks such as Multidimensional Quality Metrics (MQM) to assist non-native speakers while recognizing the high risks of real-time speech-to-speech translation.

10.2 Suggested implementation models

- **Full course integration:** Institutions can adopt the entire MOOC as a standalone 5 ECTS elective or core requirement. This model guides students through all three instructional modules sequentially, culminating in the 50–60 hour Capstone Project where they design a complete clinical workflow.
- **Supplementary material:** Trainers can extract specific units to enrich existing syllabi. For example, a standard medical ethics class could assign the unit on "Fostering Trust in Medical AI" as mandatory pre-reading to stimulate discussions on patient autonomy and algorithmic transparency. A communication class could utilize the unit on "Generative AI for Medical Procedure Image Generation" to teach practical prompt engineering for health literacy.
- **Project-based learning:** The curriculum can be anchored entirely around the Capstone PBL task. In this model, classroom time is transformed into a design studio where students act as "Clinical AI Integration Specialists,"

and the MOOC's theoretical units serve as an on-demand resource library to help them map out their patient journey diagrams and pass their ethical audits.

10.3 Steps for institutional integration

1. **Review the institutional policy on external learning platforms and AI usage:** Trainers must ensure the MOOC aligns with the institution's digital guidelines, and verify what authorized generative AI tools or image generators students are permitted to use on campus to practice prompt engineering.
2. **Identify where the curriculum and MOOC content align:** Map the specific learning outcomes of the MOOC to national or institutional VET standards.
3. **Communicate with students about how the MOOC contributes to their grade:** Clearly outline the assessment criteria. If utilizing the full course, explain that the Capstone Project (worth 2 ECTS) will be graded via the provided rubric, emphasizing that 20% of their mark hinges on their ethical reflection (the "Black Box" audit) and 25% on their technical AI solution design.
4. **Plan classroom time to complement independent MOOC study:** Utilize a flipped classroom approach. Assign the text and video content for independent study, reserving classroom hours for active application. Use in-person time for role-playing exercises, executing the 15-minute instructor "check-ins" for project milestones, and debating topics such as managing AI autonomy versus human-in-the-loop oversight.

11. Supporting students with different backgrounds and needs

11.1 Supporting Students with Low Digital Skills or No Prior AI Knowledge

Many initial vocational education and training (IVET) students possess high empathy or clinical interest but struggle with abstract technological concepts. Because this MOOC requires zero programming or technical coding background, trainers can lower the entry barrier by focusing strictly on functional applications.

- **De-escalate Technological Anxiety:** Remind students that interacting with generative AI is structurally identical to writing a precise clinical prescription or care plan—it relies on clear, plain-language instruction, not software development.
- **Utilize Scaffolded Blueprints:** Rather than allowing "trial-and-error" prompting, provide fixed frameworks such as the 5-step prompt engineering model (Core Action, Patient Context, Jargon Simplification, Layout Structure, and Safety Constraints) so tech-anxious students can fill in blanks systematically.
- **Provide Guided Software Sandboxes:** Allow students with low digital skills to practice on highly accessible, authorized chat or image-generation user interfaces before expecting them to map advanced system-level workflows.
- **Managing Different Learning Speeds**

In an IVET environment, some students will grasp workflow optimization rapidly, while others require extensive time to process how tools like Clinical Decision Support Systems (CDSS) function.

- **Modular Phase-Gated Progression:** Leverage the course's asynchronous unit design, allowing self-paced independent study for the theoretical content (75–90 hours total) while reserving class hours for practical calibration.
- **Structured Milestones for Complex Tasks:** Break down the comprehensive 2,000-word Capstone Project into its six defined chronological phases (Problem Definition, Literature Review, Tool Selection, Workflow Design, Ethical Audit, and Synthesis).
- **Targeted Time-Boxed Consultations:** Implement the recommended 15-minute individual instructor "check-ins" specifically at the end of Phase 2 (Baseline Analysis) and Phase 4 (Journey Mapping) to prevent slower paced students from falling behind or getting stuck on workflow logic.

11.2 Mitigating Fear and Anxiety About AI

Students frequently exhibit resistance or anxiety stemming from the "black box" nature of automated software, fearing that AI will cause clinical errors, compromise patient data privacy, or entirely replace human medical staff.

- **De-mystify the Opaque "Black Box":** Introduce the "Human-in-the-Loop" (HITL) model immediately to demonstrate that AI is an assistant, not an autonomous authority. Teach students that they are the "empathetic guardians" legally accountable under the EU AI Act for validating all outputs.
- **Highlight Career-Sustaining Workload Relief:** Frame AI tools as a direct solution to institutional burnout and rushed consultations. Show students how real-time NLP digital scribes automate manual note-taking to restore eye contact, and how machine learning can suppress irrelevant clinical alerts by 14% to 90% to cure "alert fatigue".
- **Address Ethical Tensions Transparently:** Engage anxious students by exploring the built-in ethical case studies, such as configuring temporary data "forgetting" mechanisms to protect the privacy of vulnerable outpatients managing high-stigma conditions such as HIV.
- **Accommodating Students with Disabilities**

The technological landscape of this course offers unique multimodal opportunities to support inclusive learning for students with diverse physical, sensory, or cognitive needs.

- **Leverage Multimodal Design Patterns:** Capitalize on the distinction between unimodal text models and multimodal models. Trainers can encourage students with visual impairments to utilize text-to-speech tools and AI graphic-description transcriptions, while students with writing difficulties can use real-time speech-to-text NLP tools to draft prompts and document ideas.
- **Address Health Literacy Concepts Internally:** Use the course's core focus on treating the 47% of European adults with problematic health literacy as a pedagogical blueprint for the classroom itself. Ensure all supplemental training sheets, prompt templates, and rubric requirements bypass heavy, complex scientific jargon in favor of plain language and highly structured visual layouts.

Table 2 Trainer's Strategy Summary

Student Profile	Primary Barrier	Actionable Classroom Strategy
Low Digital Skills	Trial-and-error software frustration.	Provide pre-baked sentence frames and standard templates.
Varying Learning Speeds	Project stagnation or operational overwhelm.	Enforce the structured six-phase capstone delivery with 15-minute diagnostic checks.
AI Anxiety / Skepticism	Fear of displacement or error.	Focus on data-proven alert fatigue reduction (14%–90%) and the legal mandate for human oversight.
Diverse Abilities	Strict text-heavy learning friction.	Utilize speech-to-text NLP dictation and plain-language layout structures.

Instructional Practice Note: When grading diverse cohorts, focus evaluations heavily on a student's logical application of safety boundaries and clinical common sense rather than the technical complexity of their proposed digital tools. A student who designs a simple, secure patient workflow with absolute "human-in-the-loop" clarity should always outscore a student who proposes a highly complex, fully automated system lacking legal or ethical safeguards.

12. Additional resources for teachers: Useful Articles and Further Reading

Doctor-Patient Communication & General AI:

- Ha, J. F., & Longnecker, N. (2010). Doctor-patient communication: a review. *Ochsner journal*, 10(1), 38–43.
- Laymouna, M., Ma, Y., Lessard, D., Schuster, T., Engler, K., & Lebouché, B. (2024). Roles, Users, Benefits, and Limitations of Chatbots in Health Care: Rapid Review. *Journal of medical Internet research*, 26, e56930. <https://doi.org/10.2196/56930>
- Cao, D. Y., Silkey, J. R., Decker, M. C., & Wanat, K. A. (2024). Artificial intelligence-driven digital scribes in clinical documentation: Pilot study assessing the impact on dermatologist workflow and patient encounters. *JAAD International*, 15, 149–151. <https://doi.org/10.1016/j.jdin.2024.02.009>

Machine Translation & Medical Imaging:

- Zappatore, M., & Ruggieri, G. (2024). Adopting machine translation in the healthcare sector: A methodological multi-criteria review. *Computer Speech & Language*, 84, 101582. <https://doi.org/10.1016/j.csl.2023.101582>
- Investigating Gender and Racial Biases in DALL-E Mini Images. (n.d.). *ACM Journal on Responsible Computing*. Retrieved 9 June 2026, from <https://dl.acm.org/doi/10.1145/3649883>

Medical Adherence & Trust:

- Roosan, D., Padua, P., Khan, R., Khan, H., Verzosa, C., & Wu, Y. (2024). Effectiveness of ChatGPT in clinical pharmacy and the role of artificial intelligence in medication therapy management. *Journal of the American Pharmacists Association : JAPhA*, 64(2), 422–428.e8. <https://doi.org/10.1016/j.japh.2023.11.023>
- Asan, O., Bayrak, A. E., & Choudhury, A. (2020). Artificial Intelligence and Human Trust in Healthcare: Focus on Clinicians. *Journal of Medical Internet Research*, 22(6), e15154. <https://doi.org/10.2196/15154>
- Mason, M., Cho, Y., Rayo, J., Gong, Y., Harris, M., & Jiang, Y. (2022). Technologies for Medication Adherence Monitoring and Technology Assessment Criteria: Narrative Review. *JMIR mHealth and uHealth*, 10(3), e35157. <https://doi.org/10.2196/35157>

Videos

- **Doctor-Patient AI Interactions:** A short but specific presentation on why Doctor-Patient interactions matter https://www.youtube.com/watch?v=RZT9Yr4X4_I
- **Ethics and Consent:** Understanding ethical dilemmas - example is a self driving car, but can be translated to medical contexts. <https://www.youtube.com/watch?v=ixloDYVfKA0>

Medication Adherence:

- Exploring the definition and importance of medication adherence (<https://www.youtube.com/watch?v=xtN8xcsodpQ&pp=ygUUbWVkaWNhdGlvbiBhZGhlcmVuY2U%3D>).
- The relationship between medication adherence and patient outcomes https://www.youtube.com/watch?v=sEUrdezh_Z4
- Conversational AI and chatbots for patient education (https://youtu.be/euB7Kmnf55k?si=n2BEzPje_DC6l_m).

Machine Translation Research: Introduction to using Scopus for discovering the latest peer-reviewed healthcare literature (<https://www.youtube.com/watch?v=tCj8C4L34VA>).

Key AI Tools and Platforms to Explore

- **Generative Image Models:** DALL-E 3 (OpenAI) is highly recommended for practicing prompt engineering to generate simplified, low-creativity medical diagrams.
- **Large Language Models (LLMs):** ChatGPT (e.g., GPT-4.0, GPT-5.2) can be utilized to demonstrate Automated Medication Therapy Management (MTM) and the translation of complex medical jargon into plain language[cite: 6, 8].
- **Machine Translation (MT) Services:** DeepL, Musely AI, No barrier AI, and Marble Care provide advanced translation capabilities for healthcare texts. The European Commission also provides translation services such as eTranslation and eBriefing.
- **Open-Source Model Tracking:** Ollama is an application that allows users to download, run, and track popular small open-source LLMs locally on standard computers without needing cloud infrastructure.

Policy and Framework Resources

- **EU AI Act & GDPR:** Critical regulatory frameworks ensuring human-in-the-loop legal accountability and the secure processing of sensitive patient data[cite: 2, 6].
- **Multidimensional Quality Metrics (MQM):** A standardized framework for evaluating translation accuracy and categorizing MT errors (e.g., mistranslation, addition, omission).
- **FUTURE-AI:** An international consensus guideline for trustworthy and deployable artificial intelligence in healthcare[cite: 9].
- **Medical Taxonomies and Ontologies:**
 - *SNOMED CT:* An international clinical standard for precise electronic health information exchange.
 - *ICD-11:* The World Health Organization's comprehensive classification of diseases.
 - *MeSH (Medical Subject Headings):* A controlled vocabulary produced by the National Library of Medicine for cataloging biomedical information.
- **AI Knowledge Repository:** Maintained by the UK's NHS AI team, providing resources for the responsible adoption of AI in healthcare.

Ready-to-Use PPT Templates and Toolkits

Teachers can directly utilize the structured frameworks provided in the Capstone Project materials to guide classroom activities, presentations, and student assessments:

- **AI Tool Selection Template:** A ready-to-use framework for students to map out proposed AI applications, explain how they improve adherence/trust, and detail their potential "Black Box" risks[cite: 10].
- **Comprehensive Project Quality & Ethical Checklist:** A robust auditing tool allowing students to verify their own clinical problem analysis, AI functional alignment, workflow mapping (Human-in-the-Loop), and adherence to the four pillars of bioethics (Autonomy, Beneficence, Non-maleficence, Justice)[cite: 10].

13. Self-study guidance for IVET trainers

Recommended Reading Order

To maximize your independent preparation and confidently deliver this curriculum to Continuing Vocational Education and Training (IVET) learners, it is recommended to approach the self-study materials in the following sequence:

- **Step 1: Core Communication & Technology Foundations (Module 1):** Start with *Unit 1* and *Unit 3* to master the primary objectives of doctor-patient communication, the "black box" trust gap, and the baseline capabilities of Natural Language Processing (NLP) scribes and Clinical Decision Support Systems (CDSS). Complete this step by reading *Unit 2* to establish the underlying bioethical and data privacy (GDPR) constraints.
- **Step 2: Practical Practical Application and Tools (Module 2):** Read *Unit 2* to understand how Machine Translation (MT) risks are stratified and how the Multidimensional Quality Metrics (MQM) framework is applied to catch translation errors. Follow this with *Unit 3* to practice the 5-step prompt engineering model required to generate plain-language patient visuals.
- **Step 3: Behavioral Analysis and Advanced Safety (Module 3):** Review *Unit 1* and *Unit 2* to understand the behavioral phases of medication non-adherence and how advanced AI filters out irrelevant hospital warnings to cure "alert fatigue". Read *Unit 3* to synthesize your understanding of institutional trust and inclusive design.
- **Step 4: Problem-Based Learning Architecture (Capstone Project):** Finally, thoroughly dissect the "AI4VET4AI_AI Doctor-Patient Interaction_PBL task.docx" file. Reviewing the six project phases, the *AI Tool Selection Template*, and the *Comprehensive Quality & Ethical Checklist* beforehand will help you understand exactly how your students are expected to apply the course theory in their final 2,000-word portfolio.
- **Estimated Preparation Time**

Preparing to teach working professionals and adult upskilling learners requires balancing your own technical mastery with operational lesson planning.

Table 3 Recommended Instructor Preparation Plan

Activity	Estimated Time	Focus Area
Foundational Text Review	6–8 Hours	Reading all 9 units across the 3 core modules and analyzing the required literature references.
Hands-On Tool Sandbox Testing	3–4 Hours	Experimenting with authorized generative image models and text LLMs using the 5-step prompt engineering blueprint to verify anatomical accuracy boundaries.
Capstone Case Calibration	2 Hours	Reviewing the grading rubric, baseline data (like the 27% malpractice statistic), and setting up internal milestones for student "check-ins".
Institutional Policy Alignment	2 Hours	Verifying campus AI usage guidelines, checking local GDPR data-handling protocols, and tailoring classroom reflection prompts to the specific clinical backgrounds of your cohort.
Total Recommended Prep Time	13–16 Hours	Note: This investment drastically cuts down your active course orchestration time by establishing clear assessment boundaries early.

13.1 Reflection Questions for Trainers

Pedagogical Alignment

- How can this MOOC specifically support your current adult learners who possess deep clinical intuition but suffer from high technical anxiety or low digital skills?
- Which specific AI use cases—such as real-time NLP digital documentation scribes or automated hospital medication reconciliation—are most immediately relevant to the physical workplaces of your students?

Workforce & Ethical Readiness

- Given that your IVET students may be practicing professionals, how will you handle clinical skepticism regarding AI-driven diagnostic prompts or "alert fatigue" management software?
- How can you best utilize the *Comprehensive Project Quality & Ethical Checklist* to challenge students who design fully automated systems, reinforcing their legal accountability as "empathetic guardians" under the EU AI Act?

Classroom Logistics

- How can you structure your face-to-face or tutorial hours to act as active design studios for the Capstone Project's phases, rather than repeating the self-study reading materials?
- What strategies will you use to facilitate a safe, analytical environment when students debate emotionally charged or high-stigma scenarios, such as designing discrete adherence applications for patients managing conditions like HIV?

14. Appendices - Ready-to-Use Workplace Templates

14.1 Appendix - Constructive alignment tables

Table 4 Module 1: Introduction to Challenges in Doctor-Patient Interactions

Learning Objective	Teaching/Learning Activity	Assessment
Explain communication goals and AI impacts.	Review of communication goals and chatbot capabilities/limitations.	Multiple-choice Knowledge Check on doctor-patient communication goals and system resource misuse.
Identify ethical principles and regulatory frameworks.	Study of patient autonomy, beneficence, and the GDPR/national frameworks.	Drag-and-drop matching exercise for ethical principles and their descriptions.
Describe speech recognition and NLP mechanisms.	Analysis of clinical scribe tools and real-time transcription workflows.	Knowledge Check on the benefits and limitations of AI speech tools in clinical encounters.
Analyse CDSS and its impact on diagnostic reasoning.	Video and literature review of AI-driven CDSS, including integration challenges.	Multiple-choice evaluation on CDSS functions, interoperability, and the risk of clinical judgment erosion.

Table 5 Module 2: Overcoming Communication Barriers

Learning Objective	Teaching/Learning Activity	Assessment
Identify communication barriers.	Review of language, cultural, environmental, and literacy challenges.	Multiple-choice Knowledge Check identifying major categories of communication barriers.
Assess risk levels of MT applications.	Study of low-risk vs. high-risk MT usage and MQM error categorization.	Matching exercise categorizing clinical case studies into low-risk and high-risk MT applications.
Apply prompt engineering to generate medical visuals.	Step-by-step guide to mastering system/user prompts and simplifying jargon.	Practical prompt generation exercise defining core actions, context, structure, and safety constraints.
Formulate risk mitigation strategies.	Exploration of the "Black Box" effect, hallucinations, and foundation models.	Multiple-choice evaluation on the role of system prompts, foundation models, and human-in-the-loop requirements.

Table 6 Module Module 3: Medical Adherence and Fostering Trust

Learning Objective	Teaching/Learning Activity	Assessment
Understand medication adherence phases.	Overview of ESPACOMP phases and primary/secondary non-adherence definitions.	Multiple-choice Knowledge Check on initiation, implementation, and types of non-adherence.
Analyse barriers and facilitators.	Study of WHO's five categories of adherence influences (e.g., social, financial, condition-related).	Multiple-choice evaluation identifying specific barriers and facilitators to adherence.
Evaluate AI tools for medication support.	Review of EHR-integrated planning, educational chatbots, and Automated Medication Reconciliation.	Knowledge Check assessing the functions of predictive analytics, chatbots, and hospital safety systems.
Develop strategies to foster trust.	Examination of explainability, stigma-coping design, and the clinician's role as a mediator.	150-200 word argumentative reflection on human oversight and clinical governance in AI-mediated care.