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Integrating Artificial Intelligence into the PDCA Framework for Quality Assurance in Medical English Courses at UMP-HCMC

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Abstract

The integration of Artificial Intelligence (AI) into quality assurance frameworks presents a transformative opportunity for enhancing medical education. This study explores the application of AI within the Plan-Do-Check-Act (PDCA) cycle to ensure continuous improvement in Medical English courses at University of Medicine and Pharmacy at Ho Chi Minh City (UMP-HCMC). By aligning with the AUN-QA (Version 4.0) programme-level standards, the AI-enhanced PDCA model provides a systematic, evidence-based approach to educational quality assurance. Through AI-driven curriculum design, adaptive learning technologies, and data-driven assessment strategies, this framework supports personalized learning experiences, real-time performance monitoring, and dynamic course refinements. Furthermore, continuous assessment and stakeholder feedback guide iterative improvements, aligning the programme with industry and healthcare demands. The findings suggest that an AI-enhanced PDCA model fosters engagement, effectiveness, and sustainability in Medical English education, ultimately contributing to the production of highly competent medical professionals. This study highlights AI's potential in transforming educational quality assurance for future healthcare practitioners.

Key words: Artificial Intelligence (AI), Plan-Do-Check-Act (PDCA), AUN-QA (Version 4.0), continuous improvement, Medical English courses, educational quality assurance

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1. INTRODUCTION

Quality assurance in Medical English education is essential to ensuring that future healthcare professionals acquire the necessary language skills for effective clinical communication, patient care, and interdisciplinary collaboration. As medical education evolves, integrating Artificial Intelligence (AI) into teaching and learning processes offers a promising avenue for enhancing instructional effectiveness, assessment accuracy, and student engagement. The Plan-Do-Check-Act (PDCA) cycle, a widely adopted quality assurance framework, provides a structured, data-driven approach for continuous improvement. By integrating AI within the PDCA framework, universities can systematically refine curriculum content, improve assessment methodologies, and optimize faculty workload, leading to more efficient learning experiences. In alignment with the AUN-QA (Version 4.0) programme-level standards, this approach ensures that Medical English education remains relevant, evidence-based, and responsive to industry needs.

Recognizing the potential of AI, University of Medicine and Pharmacy at Ho Chi Minh City (UMP-HCMC) has established regulations on AI use (November 4, 2024), granting lecturers the right to leverage AI for exam creation, assignment evaluation, content development, and research. However, AI is mandated as a supporting tool rather than a substitute for human-led teaching, and faculty members are required to collect student feedback regularly to refine AI-assisted learning strategies. This regulatory framework ensures that AI-driven innovations maintain pedagogical integrity and enhance learning outcomes rather than replace essential human interaction in medical education.

This study aims to integrate AI into the PDCA cycle to enhance the quality assurance process for Medical English courses at UMP-HCMC. Specifically, it seeks to enhance curriculum development by leveraging AI to optimize teaching materials, instructional design, and adaptive learning technologies. Furthermore, AI-driven data analysis and formative assessments will enhance feedback mechanisms, ensuring continuous course improvement. Finally, AI-assisted insights will support faculty decision-making, helping instructors streamline grading, monitor student progress, and refine teaching strategies.

The scope of this study encompasses the application of AI in each phase of the PDCA cycle to enhance Medical English course quality assurance at UMP-HCMC. Key areas of focus include the development of AI-enhanced teaching materials, student performance tracking through automated assessment systems, and faculty training on AI-integrated pedagogy. By systematically integrating AI within the PDCA cycle, this study aims to bridge the gap between technology and medical language education, ensuring that Medical English courses at UMP-HCMC remain innovative, student-centered, and aligned with global quality assurance standards.

2. LITERATURE REVIEW

2.1. Overview

Quality assurance in higher education is a systematic process aimed at maintaining and improving the standards of teaching, learning, and assessment to ensure graduates meet academic and professional requirements. According to Harvey and Green (1993), quality in education encompasses multiple dimensions, including excellence, fitness for purpose, value for money, and transformation. In the context of Medical English education, quality assurance is critical to equipping students with the language proficiency and communication skills necessary for effective patient care and interdisciplinary collaboration (Hyland, 2006). Ensuring continuous improvement in Medical English instruction requires structured methodologies that can adapt to the evolving needs of medical professionals and the healthcare industry.

The PDCA cycle is a widely used framework for continuous quality improvement, consisting of four stages: planning, implementing, evaluating, and refining processes based on feedback. In higher education, it helps improve curriculum design, teaching methods, student assessment, and institutional effectiveness. The AUN-QA framework applies this model to ensure alignment with international standards. However, the effectiveness of PDCA depends on timely data collection and evidence-based decision-making, areas where AI can enhance efficiency and impact.

Integrating AI into the PDCA cycle can create a data-driven quality assurance system that continuously improves curriculum, monitors student performance, and adapts teaching strategies. AI-powered learning analytics provide insights for refining instructional methods, while automated assessment tools enhance feedback mechanisms. This AI-enhanced PDCA framework ensures efficiency, scalability, and alignment with evidence-based quality assurance practices, making it essential for advancing Medical English education and preparing competent healthcare professionals.

2.2. Educational Quality Assurance of Medical English courses at university

To provide a structured approach to quality assurance, the ASEAN University Network-Quality Assurance (AUN-QA) Version 4.0 framework has been widely adopted at the programme level. This model applies the Plan-Do-Check-Act (PDCA) cycle to guide continuous quality improvement in curriculum design, teaching and learning methods, student assessment, faculty development, and infrastructure (AUN-QA, 2020). The eight criteria outlined in AUN-QA Version 4.0 focus on: (1) Expected Learning Outcomes, (2) Programme Structure and Content, (3) Teaching and Learning Approach, (4) Student Assessment, (5) Academic Staff, (6) Student Support, (7) Facilities and Infrastructure, and (8) Output and Outcomes. By implementing this framework, universities can ensure that their programmes remain relevant, effective, and aligned with international educational standards (ASEAN University Network, 2020). However, despite its structured methodology, maintaining consistent quality in Medical English education presents several challenges.

One of the primary challenges in Medical English education is the variation in student language proficiency levels, which affects the effectiveness of teaching strategies and assessment methods (Hyland, 2006). Unlike general English courses, Medical English requires students to develop specialized vocabulary, clinical communication skills, and the ability to comprehend medical literature. Ensuring that all students achieve the required competency levels is difficult due to differences in their prior English exposure, learning styles, and motivations. Additionally, faculty development and training in Medical English instruction pose another challenge, as many instructors may not have formal training in both medical sciences and language teaching (MacDonald, 2019). Addressing these challenges requires a dynamic and data-driven quality assurance system, which can be significantly enhanced through the integration of Artificial Intelligence (AI) technologies into the PDCA cycle.

2.3. The PDCA Cycle in Educational Quality Assurance

The Plan-Do-Check-Act (PDCA) cycle, originally developed by Deming (1986), is a widely used continuous improvement framework in various fields, including education. The model consists of four iterative stages: (1)

Plan – identifying objectives and developing strategies; (2) Do – implementing the planned actions; (3) Check – monitoring and evaluating outcomes; and (4) Act – making necessary refinements based on findings. In higher education, the PDCA cycle ensures that institutions follow a systematic, evidence-based approach to improving curriculum design, teaching methodologies, student assessment, and institutional governance (Biggs & Tang, 2011). In the context of Medical English education, applying PDCA facilitates the development, implementation, and evaluation of language instruction tailored to the specific needs of medical students.

Several studies have explored the effectiveness of the PDCA cycle in language education and medical education. For instance, Ishikawa et al. (2019) conducted a study on the application of PDCA in English language courses at a Japanese university, demonstrating that the iterative refinement of instructional materials and assessment methods significantly improved students' communicative competence. Similarly, Zhang and Liu (2020) applied PDCA to medical curriculum development, showing that structured feedback loops helped align learning outcomes with clinical practice demands. In Medical English courses, a PDCA-based approach enables educators to regularly revise course content, enhance teaching strategies, and integrate student feedback, ensuring that the programme remains relevant to real-world healthcare communication (MacDonald, 2019). Despite its effectiveness, however, the traditional PDCA approach faces several challenges when applied to Medical English instruction.

One of the primary limitations of the traditional PDCA cycle in Medical English education is its reliance on manual data collection and analysis, which can be time-consuming and subjective (Nguyen & Walker, 2021). Traditional methods of evaluating student progress—such as written exams and teacher-led assessments—may not fully capture the dynamic, interactive nature of medical communication. Additionally, the feedback process in Medical English courses is often delayed, making it difficult for students to receive real-time guidance on pronunciation, fluency, and medical terminology usage (Yang, 2020). Another limitation is the inconsistency in teaching approaches, as faculty members may differ in their methods of instruction and assessment, leading to variability in learning outcomes. To address these challenges, the integration of Artificial Intelligence (AI) into the PDCA framework offers a data-driven, adaptive quality assurance system, allowing for real-time monitoring, personalized feedback, and automated curriculum improvements.

2.4. The Role of Artificial Intelligence in Education

Artificial Intelligence (AI) is transforming education by enabling data-driven decision-making, adaptive learning, and personalized instruction. One of the most significant applications of AI in education is AI-driven curriculum design, where adaptive learning systems adjust course content based on student performance and learning needs. These systems analyze learner behaviors, engagement levels, and progress to provide tailored learning experiences, ensuring that students receive appropriate challenges and support (Luckin et al., 2016). In Medical English education, AI-powered tools can customize vocabulary drills, medical scenario simulations, and clinical communication exercises, helping students develop context-specific language proficiency.

Another key application of AI is in assessment and feedback mechanisms. Traditional methods of evaluating student performance, such as written exams and instructor-led assessments, can be time-consuming and subjective. AI-powered assessment tools, including automated essay scoring, speech recognition for pronunciation evaluation, and AI chatbots for conversational practice, provide instant, objective feedback to learners (Zawacki-Richter et al., 2019). These technologies enhance student engagement by offering real-time corrections and suggestions, enabling learners to refine their medical terminology usage, pronunciation, and communication skills more effectively. In Medical English courses, AI-driven virtual patient simulations also allow students to practice clinical conversations in a realistic, low-risk environment (Yang, 2020).

AI analytics further support personalized learning pathways, allowing educators to track student progress, identify learning gaps, and recommend targeted interventions. By analyzing patterns in student performance, AI systems can suggest remedial exercises, additional practice materials, or alternative learning strategies to optimize outcomes. This approach ensures that students receive individualized support, particularly in complex subjects like Medical English, where proficiency levels and learning paces vary significantly (Nguyen & Walker, 2021). Personalized AI-driven learning fosters greater autonomy, motivation, and efficiency in skill development.

Despite these advantages, the adoption of AI in education presents challenges and ethical considerations. One major concern is data privacy, as AI systems require large amounts of student data to function effectively. Ensuring secure data management and compliance with ethical standards is crucial to maintaining student trust and institutional integrity (Holmes et al., 2021). Additionally, faculty readiness and technological infrastructure can hinder AI implementation, as educators may need training to effectively integrate AI tools into teaching and assessment practices. There are also concerns about over-reliance on AI, which may reduce human interaction

and critical thinking opportunities in the learning process. To maximize the benefits of AI in education, institutions must adopt a balanced approach that combines AI capabilities with human expertise to create a dynamic, student-centered learning environment.

2.5. AI Integration in Each Phase of the PDCA Cycle

The PDCA (Plan-Do-Check-Act) cycle is a dynamic framework widely used in continuous improvement processes. In the context of educational quality management, integrating Artificial Intelligence (AI) into the PDCA cycle can significantly enhance the design, delivery, and evaluation of courses, particularly in specialized fields like medical English. Each phase of the PDCA cycle offers a distinct opportunity to leverage AI tools, providing substantial improvements in curriculum development, teaching strategies, assessment, and overall course refinement.

Plan: In the planning phase, AI plays a crucial role in curriculum development, learning analytics, and instructional design. AI tools can analyze vast amounts of educational data, helping educators understand students' prior knowledge, learning preferences, and skill gaps. By utilizing AI-driven platforms, instructors can design personalized learning paths, identify the most effective teaching strategies, and create content that aligns with the unique needs of their students. Additionally, learning analytics powered by AI can offer insights into student performance trends, which guides the creation of a robust and responsive curriculum. AI-assisted instructional design ensures that the curriculum is both comprehensive and adaptable to students' learning requirements, facilitating a more dynamic and engaging educational experience (Baker & Siemens, 2014).

Do: The "Do" phase focuses on the implementation of AI-supported teaching methods, interactive learning tools, and real-time feedback mechanisms. AI technologies such as intelligent tutoring systems, chatbots, and virtual assistants are increasingly being used to support active learning and provide personalized instruction. These tools enhance student engagement by offering interactive exercises and simulations that cater to various learning styles. AI-powered systems also allow for real-time feedback, which helps students monitor their progress and receive guidance on areas for improvement. Furthermore, AI-driven platforms can automate administrative tasks, freeing up instructors to focus on fostering deeper student interactions. By utilizing AI, instructors can offer more tailored and timely support to students, ultimately improving learning outcomes (Zawacki-Richter, 2019).

Check: In the "Check" phase, AI proves to be invaluable for both formative and summative assessments, as well as student progress tracking. AI-powered assessment tools can evaluate student performance more efficiently and with greater accuracy than traditional methods. These tools can provide immediate feedback on assignments and quizzes, helping students to quickly understand their strengths and areas that need improvement. Furthermore, AI-based analytics systems can track student progress over time, identify patterns in learning behavior, and flag students who may need additional support. This data-driven approach allows for more precise, objective evaluations of student learning, ensuring that assessments are aligned with the curriculum and learning objectives (Gikandi, Morrow, & Davis, 2011).

Act: The final phase of the PDCA cycle, "Act," involves making data-driven decisions to refine the course and improve teaching practices. AI-based data analysis tools can provide valuable insights into the effectiveness of the course content, teaching methods, and assessments. By examining patterns in student performance, AI systems can help identify which areas of the curriculum may need modification to enhance learning outcomes. Additionally, AI can be used to inform faculty training, helping instructors better understand how to incorporate AI tools into their teaching and how to address the evolving needs of their students. Continuous feedback loops driven by AI allow for timely adjustments to teaching practices and course content, ensuring that the learning experience remains relevant and effective (Huang, 2020).

3. AI IN THE PDCA CYCLE FOR MEDICAL ENGLISH COURSES AT UMP-HCMC

3.1. Medical English courses at UMP-HCMC

At University of Medicine and Pharmacy, Ho Chi Minh City (UMP-HCMC), freshmen and second-year students in the General Practitioner Program are required to complete two compulsory 4-credit Medical English courses. These courses, integrated into the curriculum in the first and second years of study, are organized by Department of Foreign Languages, Faculty of Fundamental Sciences. Their primary objective is to equip students with essential English language skills necessary for academic and professional success in the medical field. By the end of these courses, students are expected to develop proficiency in reading, writing, speaking, and understanding medical terminology, enabling them to engage with scientific literature, clinical communication, and international medical contexts effectively.

Course Content and Learning Focus

The Medical English courses at UMP-HCMC provide a foundational understanding of English for medical purposes, covering key areas such as anatomy, physiology, and pathology. The curriculum is designed to ensure that students can navigate specialized medical literature, engage in clinical conversations, and achieve a functional level of medical English equivalent to Level 3 over 6 of the National Foreign Language Proficiency Framework. The main components of the course include:

Reading Medical Texts: Students explore English-language medical texts related to major body systems and medical conditions. This helps them develop the ability to analyze and interpret medical documents, research papers, and professional guidelines.

Medical Terminology: A focus on key medical terms, including their structure (prefixes, roots, and suffixes), allows students to enhance their vocabulary and comprehension skills for lifelong learning.

Grammar and Writing for Medicine: The course includes instruction on common grammatical structures in medical texts, enabling students to write medical summaries, case reports, and structured paragraphs on anatomy, physiology, and pathology.

Doctor-Patient Communication: Through structured doctor-patient dialogues, students practice essential clinical communication skills in English, preparing them to conduct medical interviews and consultations with international patients.

Speaking and Presentation Skills: Students are trained to deliver medical presentations, enhancing their ability to communicate complex medical concepts clearly and professionally in English.

Translation Skill: Students are trained to read, analyze, and translate medical documents into Vietnamese, including research papers, case studies, and clinical guidelines. This helps them understand complex medical information and communicate it clearly in their native language.

Continuous Improvement Through Student Feedback

At the end of each course, students are required to complete a feedback survey conducted by the faculty's Unit of Educational Quality Assurance. The feedback is then analyzed and forwarded to the Department of Foreign Languages to guide curriculum refinement. This data-driven approach, based on the PDCA (Plan-Do-Check-Act) cycle, ensures continuous improvement in course content, teaching methods, and student engagement, aligning Medical English training with the evolving demands of medical education and practice.

3.2. AI in the Plan phase for course design to optimize the curriculum

In the Plan phase of the PDCA cycle, Artificial Intelligence (AI) can be leveraged to optimize the curriculum of Medical English courses at UMP-HCMC, ensuring that students achieve the defined Course Learning Outcomes (CLOs) effectively. AI-driven tools and analytics play a crucial role in structuring course content, aligning instructional materials with student needs, and enhancing overall learning efficiency.

AI for Course Learning Outcome (CLO) Alignment

To ensure that students meet the CLOs, AI can analyze vast amounts of educational data, including past student performance, feedback, and learning patterns. Through machine learning models, AI can suggest improvements in the curriculum, recommend personalized learning paths, and ensure that course materials effectively address key competencies.

For instance, the Medical English courses at UMP-HCMC focus on the following CLOs:

1. Specialized Medical English for Research and Practice

AI-powered content curation tools can help identify the most relevant medical literature, databases, and case studies to support students in using Medical English for research, clinical work, and lifelong learning. For example, when reading a journal article on cardiovascular diseases, students can use Elicit AI to generate a summary of key findings and treatment approaches.

Adaptive learning platforms can personalize reading assignments based on a student's progress, ensuring they develop the ability to read, understand, and summarize complex medical texts. For instance, Newsela AI can adjusts the reading level of medical texts based on a student's comprehension level. A beginner struggling with a research paper on chronic kidney disease can get a simplified version while maintaining essential medical content.

2. Medical Terminology Mastery

AI-driven glossary builders and interactive terminology trainers can assist students in defining and comprehending medical terms. For example, Merriam-Webster Medical AI Dictionary provides definitions, pronunciations, and word origin breakdowns. A student encountering the term *"endocarditis"* can use AI to break down the word into *"endo-" (inside), "card-" (heart), and "-itis" (inflammation)***,** making it easier to understand.

NLP (Natural Language Processing) tools can break down medical terms into their prefixes, roots, and suffixes, enabling students to analyze and construct medical terminology efficiently. For instance, Google's BERT AI can analyze the contextual meaning of medical terms in different clinical scenarios. When studying diabetes complications, AI can highlight different meanings of *"insulin resistance"* in pathophysiology and treatment contexts**.**

3. Reading and Grammar Proficiency in Medical Contexts

AI-enhanced grammar checkers and text analysis tools can provide real-time feedback on students' grammar usage in reading comprehension and writing assignments. For example, Grammarly AI & ChatGPT provide real-time grammar corrections and style enhancements. When writing a clinical case summary, AI suggests more precise medical phrasing and corrects grammatical errors.

Smart reading platforms can assess skimming and scanning abilities, ensuring students can identify key ideas and specific details in medical texts. For instane, Question Generation AI (e.g., GPT-based models) and Text Mining can generate questions based on the key concepts in the medical text, such as asking about specific details (e.g., "What is the first symptom of this disease?"). Students can then practice skimming and scanning to answer these questions. The AI system can evaluate their answers based on the presence of relevant details, offering feedback on accuracy and completeness.

4. Listening and Speaking Skills in Medical Communication

AI-based speech recognition and conversational AI can improve doctor-patient role-playing by analyzing pronunciation, fluency, and contextual appropriateness. For example, Lifelike AI-powered Virtual Patients can simulate real-world interactions. A student practicing a patient consultation on abdominal pain can receive AI-generated responses, mimicking real patient concerns.

Virtual patient simulations, powered by AI, can simulate real-world medical dialogues, allowing students to practice listening and responding effectively in English. For example, Speechmatics AI can evaluate pronunciation and fluency in real time. A student learning how to explain a diagnosis can get instant AI feedback on pronunciation accuracy and clarity**.**

5. Medical Presentation and Writing Proficiency

AI-generated feedback on presentations and written assignments can help students refine their skills in delivering medical topics, summarizing medical texts, and writing structured paragraphs on anatomy and physiology. For instance, ELOQUENCE AI provides feedback on tone, clarity, and engagement**.** When practicing a presentation on hypertension**,** AI analyzes voice modulation, pauses, and emphasis to improve delivery.

6. Translation Accuracy

AI tools can be used to help students identify and correct inaccuracies in their translations during practice sessions. For instance, DeepL AI & Google Translate AI provide highly accurate translations of medical content. A student preparing a multilingual presentation on infectious diseases can use AI to translate key medical terms without losing technical accuracy.

In brief, by integrating AI in curriculum planning, UMP-HCMC can develop a dynamic, data-driven approach to ensure that students not only meet but excel in their Medical English competencies, enhancing both their academic and professional capabilities. With AI-enhanced course planning, Department of Foreign Languages at UMP can ensure that its Medical English courses remain up-to-date, engaging, and tailored to the evolving needs of medical students, ultimately improving their proficiency and confidence in using English in a medical context.

3.3. AI in the DO phase for implementing teaching, learning and assessment process

In the DO phase of the PDCA (Plan-Do-Check-Act) cycle, Artificial Intelligence (AI) plays a transformative role in enhancing teaching, learning, and assessment in Medical English courses at UMP-HCMC. By leveraging AI-powered tools, lecturers can take advantage of student-centered approach that integrates problem-based learning

(PBL), and interactive simulations, ensuring that students effectively achieve their Course Learning Outcomes (CLOs).

3.3.1. AI Chatbots and Virtual Assistants for Interactive Learning

AI-powered chatbots and virtual assistants, such as ChatGPT, IBM Watson Assistant, and Microsoft Copilot, serve as 24/7 learning companions that enhance the learning experience by providing instant feedback, personalized tutoring, and interactive practice. These AI-driven tools assist students in understanding medical terminology, improving writing skills, and engaging in real-time conversational exercises, making Medical English learning more engaging, accessible, and effective.

Enhancing Medical Terminology Comprehension: Medical English contains specialized terminology that can be difficult for students to grasp. AI chatbots act as on-demand medical dictionaries, instantly providing definitions, usage examples, and contextual explanations for complex terms. Unlike traditional dictionaries, AI-powered assistants can explain medical jargon in simpler terms, helping students understand and apply vocabulary in clinical settings. For example, a student struggling with the term "myocardial infarction" can ask an AI chatbot for an explanation. The chatbot may respond: *"Myocardial infarction, commonly known as a heart attack, occurs when the blood supply to the heart muscle is blocked. Would you like an example sentence using this term in a medical case?"*. This interactive approach reinforces learning by providing definitions, context, and real-world examples, making terminology easier to remember and apply.

Improving Medical Writing Skills: Writing clear and professional medical reports, case presentations, and patient records is a crucial skill for medical students. AI-powered virtual tutors assist by analyzing sentence structure, grammar, and coherence, offering real-time corrections and suggestions to enhance clarity. These AI tools can also help with medical document formatting, citation styles, and appropriate tone for clinical communication. For example, a student writing a patient discharge summary can use an AI chatbot to refine their draft: *"The patient is having pain from 3 days and not feeling good*." And here is AI Correction: *"The patient has been experiencing pain for three days and reports feeling unwell."* AI-powered writing assistance helps students develop precise, professional, and grammatically accurate medical writing skills, ensuring effective documentation and communication in a clinical setting.

Real-Time Doctor-Patient Conversation Simulations: Effective spoken communication is essential in medical practice, particularly in doctor-patient interactions. AI-powered chatbots can simulate clinical conversations, allowing students to practice interviewing patients, explaining diagnoses, and giving medical advice in English. These virtual tutors provide real-time feedback on pronunciation, fluency, coherence, and appropriateness of responses, helping students build confidence in medical English communication. For instance, a student practicing a patient interview can engage in a simulated conversation:

AI Chatbot (as the patient): *"Doctor, I have been feeling dizzy and weak for the past few days. What could be wrong?"*

Student (as the doctor) : *"Can you describe when the dizziness started and if you have any other symptoms?"*

AI Feedback: *"Good follow-up question! Try adding more clarification: 'Have you experienced any chest pain or shortness of breath along with the dizziness?'"*

These AI-driven simulations allow students to practice and refine their communication skills in a risk-free environment, preparing them for real-world clinical encounters. AI chatbots and virtual assistants provide interactive, student-centered learning experiences that enhance medical vocabulary, writing proficiency, and clinical communication skills. By offering instant feedback, real-time simulations, and personalized tutoring, AI-driven tools bridge the gap between theoretical knowledge and practical application. As Medical English courses at UMP-HCMC integrates these technologies, students can develop confidence and competence in using English for clinical interactions, medical documentation, and professional communication in global healthcare settings.

3.3.2. AI for Problem-Based Learning (PBL) and Critical Thinking Development

Problem-Based Learning (PBL) is an active learning approach that encourages students to develop critical thinking, problem-solving, and clinical communication skills by engaging with real-world medical scenarios. In Medical English courses at UMP-HCMC, AI-powered tools enhance PBL activities by facilitating virtual case simulations and automated medical text analysis, enabling students to interact with complex clinical situations and refine their decision-making abilities.

AI-Driven Clinical Case Simulations: AI-powered clinical simulation platforms, such as Body Interact and SimX, provide immersive virtual patient encounters that challenge students to interpret symptoms, apply medical terminology, and communicate effectively. These simulations replicate real-life clinical settings,

allowing students to engage in patient diagnosis and treatment discussions while receiving AI-generated feedback on their language use, questioning techniques, and diagnostic reasoning. For example, a student using Body Interact encounters a virtual patient experiencing respiratory distress. The AI system evaluates their communication skills, assessing whether the student:

Asks appropriate follow-up questions: *"When did the shortness of breath start?"*

Uses correct medical terminology: *"Do you have a history of chronic obstructive pulmonary disease?"*).

Demonstrates logical reasoning in diagnosing the condition.

As a result, AI can ensure that students practice structured patient interviews and improve their ability to explain symptoms, diagnoses, and treatment options in English. Virtual cases can allow risk-free, hands-on learning, preparing students for real-life clinical encounters. Furthermore, AI-generated feedback helps students identify communication gaps and refine their clinical English proficiency.

AI-Powered Medical Text Analysis for Critical Reading and Writing: Understanding complex medical texts—including research articles, case studies, and patient records—is a fundamental skill for medical professionals. AI tools help students develop critical reading and writing abilities by analyzing medical literature and offering real-time feedback on comprehension, coherence, and medical accuracy. AI can enhance medical text analysis by:

Extracting key findings from lengthy research papers, enabling students to focus on essential clinical insights.

Identifying and explaining complex medical terminology, bridging the gap between technical language and practical understanding.

Assessing written reports by providing feedback on grammar, coherence, and appropriate use of medical terminology.

For example, for a PBL assignment on antibiotic resistance, AI-powered tools assist students by summarizing key research findings from English-language medical journals, allowing students to quickly grasp essential concepts, providing translation support, helping students interpret critical medical data in Vietnamese, and evaluating written analyses, offering AI-generated feedback on terminology use, sentence structure, and clarity.

So AI can enable students to process complex medical information efficiently, improving their ability to synthesize and apply knowledge. Automated feedback enhances scientific writing skills, ensuring students communicate findings effectively in English. AI fosters higher-order thinking skills, encouraging students to critically evaluate medical literature rather than relying on rote memorization. By integrating AI-powered tools into PBL and critical thinking development, Medical English courses at UMP-HCMC can create a dynamic, interactive, and student-centered learning environment. AI-driven clinical case simulations provide real-world medical practice, enhancing diagnostic reasoning and doctor-patient communication skills. Meanwhile, AI-supported medical text analysis ensures that students master complex medical terminology, improve critical reading skills, and refine scientific writing. These innovations not only bridge the gap between theoretical learning and practical application but also prepare students to function effectively in global healthcare settings.

3.3.3. AI for MCQ Development at Higher Levels of Bloom's Taxonomy

Beyond improving instruction, AI is revolutionizing assessment methods by generating multiple-choice questions (MCQs) that evaluate higher-order cognitive skills. AI-powered assessments align with Bloom's Taxonomy, enabling students to go beyond simple recall and develop competencies in application, analysis, synthesis, and evaluation. These AI-driven innovations not only improve language proficiency but also prepare students for real-world medical communication and decision-making. AI-powered MCQ generators such as **ChatGPT, Quizizz AI, and QuestionPro** create **case-based** and **comparative** questions that assess **real-world clinical application**.

AI-generated case-based MCQs for application and analysis: AI can enhance case-based assessments by generating questions that mirror real patient scenarios. For example, one application-Level MCQ for doctor-patient communication CLO can be:

Scenario: A 60-year-old male patient with a history of diabetes mellitus presents with a non-healing foot ulcer that has persisted for several weeks, raising concerns about potential infection, poor circulation, and the risk of diabetic complications.

Question: During the patient consultation, which of the following is the most appropriate way to elicit information about the progression of the foot ulcer?

A. "When did you first notice the ulcer, and have you observed any changes in its size or appearance?"
B. "Have you ever had a foot ulcer before, or is this the first time you've experienced something like this?"
C. "Why didn't you come to the hospital sooner if the ulcer wasn't healing?"
D. "Are you feeling anxious about your diabetes and how it's affecting your health?"

Option A is correct because it uses open-ended questions to gather specific details about the ulcer's progression, which is essential for assessing its severity and identifying possible complications. Option B is relevant but does not directly address the current condition's development. Option C may make the patient feel defensive, while Option D, though important for psychosocial assessment, does not focus on the ulcer itself.

AI-powered comparative MCQs for evaluation and critical thinking: AI-generated evaluation-level MCQs challenge students to compare and assess medical language in clinical contexts**.** For example, one evaluation-level MCQ for medical terminology CLO can be:

Scenario: A 70-year-old male patient with a history of chronic obstructive pulmonary disease (COPD) arrives at the clinic with worsening shortness of breath and a productive cough. The doctor considers whether to describe the condition as an "exacerbation" or a "progression" of COPD.

Question: Which term best describes the patient's current condition, and why?

A. "Exacerbation," because the symptoms have worsened suddenly due to an acute trigger.
B."Progression," because COPD naturally worsens over time.
C. Either term is correct, as both describe worsening symptoms.
D. Neither term is appropriate, as the diagnosis remains unchanged.

Option A is correct because the term ***"****exacerbation"* refers to a sudden worsening of COPD symptoms, while ***"****progression"* describes a gradual decline over time. This question encourages students to critically evaluate medical terminology in a clinical context.

As a result, in assessment, AI-driven methodologies enable a data-driven, student-centered approach that emphasizes real-world application and problem-solving. AI-generated MCQs move beyond memorization, fostering analytical reasoning, clinical judgment, and medical communication skills—all crucial for future medical professionals. With AI-driven innovations, Medical English courses at UMP-HCMC can evolve into a dynamic, technology-enhanced learning experience that prepares students for success in the medical field.

3.4. AI in the CHECK Phase: Evaluating Course Effectiveness in Medical English at UMP-HCMC

In the CHECK phase of the PDCA (Plan-Do-Check-Act) cycle, AI plays a crucial role in evaluating the effectiveness of Medical English courses at UMP-HCMC by systematically analyzing student feedback, and learning outcomes. AI-driven analytics provide real-time insights, automate data processing, and enhance decision-making, enabling instructors and curriculum developers to implement evidence-based improvements. This ensures that the courses remain aligned with Course Learning Outcomes (CLOs) and continuously evolve to meet the needs of medical students.

Student feedback is a critical component of the CHECK phase, helping educators identify areas for improvement. Traditionally, analyzing large volumes of qualitative feedback from course evaluations can be time-consuming and subjective. However, AI-based sentiment analysis tools—such as MonkeyLearn, Lexalytics, and IBM Watson AI—can process and classify feedback automatically, ensuring a data-driven approach to curriculum refinement. AI can enhance student feedback analysis by:

Detecting key themes and concerns: AI categorizes student responses into major themes, such as difficulty levels, content engagement, or technical issues, allowing educators to quickly identify problem areas.

Classifying opinions as positive, neutral, or negative: AI sentiment analysis determines overall student satisfaction and highlights concerns that require immediate attention.

Summarizing common issues for quick action: AI generates concise reports outlining frequent complaints or suggestions, providing instructors with actionable insights.

For example, if students express positive feedback about case-based discussions but negative feedback about traditional lectures, AI may suggest more problem-based learning (PBL) activities to enhance engagement.

As a result, AI-driven sentiment analysis ensures that student feedback is systematically analyzed and translated into meaningful course improvements.

By leveraging AI in the CHECK phase, UMP-HCMC can systematically evaluate course effectiveness, optimize instructional content, and enhance student learning experiences. AI-driven analytics bridge the gap between student performance data and actionable improvements, ensuring that Medical English courses remain responsive, adaptive, and aligned with both academic and professional medical communication needs. This AI-enhanced evaluation process ensures continuous quality improvement, ultimately preparing students for real-world medical interactions in English.

3.5. AI in the ACT Phase: Driving Continuous Course Improvement in Medical English at UMP-HCMC

In the ACT phase of the PDCA cycle, AI becomes a valuable tool in driving continuous improvement for Medical English courses at UMP-HCMC. This phase focuses on using data from student feedback and course evaluations to make informed changes. AI can quickly analyze large amounts of feedback, identifying patterns and areas for improvement. For example, if students consistently struggle with specific medical terminology or concepts, AI can highlight these areas for instructors to address. By understanding these trends, instructors can modify lesson plans or introduce new resources that better meet student needs.

Moreover, AI helps ensure that the Medical English courses remain aligned with the Course Learning Outcomes (CLOs) and are responsive to both academic and clinical requirements. It can track how well students are achieving the CLOs over time and suggest adjustments to the curriculum, ensuring it stays up to date and effective. In this way, AI not only supports instructors in making real-time adjustments but also contributes to long-term improvements, keeping the courses relevant and adaptive to the ever-evolving demands of medical education.

In conclusion, by applying AI in the ACT phase, UMP-HCMC can continuously refine its Medical English courses, ensuring they remain adaptive, data-driven, and aligned with evolving medical and educational needs. AI enhances curriculum design, faculty training, and student engagement, creating a dynamic learning environment that prepares future healthcare professionals for global medical communication. Ultimately, AI-driven continuous improvement empowers both students and instructors, making Medical English education more effective, personalized, and impactful.

4. CHALLENGES AND CONSIDERATIONS

When applying AI to the PDCA cycle of Medical English courses at UMP-HCMC, several challenges and considerations must be addressed to ensure its effective integration and utilization.

4.1. UMP's decision on AI application in teaching, learning, and assessment

Another critical consideration is UMP's decision on AI application in teaching, learning, and assessment, as outlined in the Regulations on the Use of AI in Activities at the University of Medicine and Pharmacy at Ho Chi Minh City (November 4, 2024). According to the regulations, AI is seen as a supportive tool rather than a primary driver of teaching and research. This means that while AI can be employed to assist with tasks such as exam creation, assignment evaluation, and data analysis, it cannot replace human instructors or fully automate the learning process. This restriction calls for careful planning regarding how AI can complement traditional methods and ensure that its use aligns with both the educational goals and the responsibilities of lecturers, such as regularly gathering feedback from students to adjust teaching strategies.

Lastly, the regulations also stipulate that AI tools must be used in a manner consistent with ethical and educational standards. Lecturers and faculty must ensure that AI is used only as a supportive tool and not as a substitute for human interaction or judgment. This requirement emphasizes the importance of balancing AI use with traditional pedagogical approaches to maintain the quality and integrity of the learning experience. Consequently, the integration of AI must be carefully managed to ensure it is both effective and in line with UMP's educational values and goals.

4.2. Cost barrier

One of the primary challenges is the cost associated with implementing an AI platform. Developing or purchasing AI tools that can analyze large datasets, such as student feedback and course evaluations, requires a significant financial investment. This expense could limit the accessibility of AI applications for certain departments or faculties unless there is adequate funding or institutional support. As a result, UMP may need to carefully weigh the benefits of AI against the potential costs, especially considering long-term financial sustainability. This expense could be a major barrier to access for departments or faculties that may not have dedicated funding for such technology. For example, robust AI platforms that use machine learning to analyze trends or generate customized reports can come with high subscription costs, often requiring a budget for

licenses, technical support, and training. Moreover, these platforms may require additional resources such as computational power and software integration with the university's existing systems, adding further to the cost.

To address this challenge, UMP could consider using free or basic versions of AI tools as an initial step. Many AI platforms offer free or low-cost plans, which can provide a starting point for incorporating AI into course development and evaluation processes without a large financial commitment. For instance, tools like Google AI, IBM Watson Studio, and Microsoft Azure AI offer basic packages with limited features that can still analyze small datasets and generate basic insights, such as sentiment analysis from student feedback or trend identification across course evaluations. These tools are user-friendly and can help instructors start integrating AI with minimal upfront costs.

Another suggestion is to gradually introduce AI across departments, starting with small-scale pilots in a few courses. For example, a department might select a single Medical English course to implement an AI tool for analyzing student feedback and evaluation data. This allows UMP to test the effectiveness of AI and determine if the benefits—such as more accurate assessments and faster course adjustments—justify the investment, before expanding AI use to other courses or departments. This phased approach ensures that costs remain manageable and that the institution has time to evaluate the long-term financial sustainability of AI applications.

In conclusion, while the cost of AI platforms can be a significant challenge, there are practical and cost-effective strategies UMP-HCMC can explore. Using free or basic versions of AI tools, leveraging open-source platforms, and considering collaborative partnerships can help mitigate the financial impact. Additionally, adopting a phased approach with pilot programs will allow UMP to assess the value of AI in course improvement without committing large sums of money upfront. These strategies can help UMP integrate AI into the PDCA cycle for Medical English courses in a way that is both effective and financially sustainable.

4.3. Techical difficulties

Technical difficulties are a significant challenge when integrating AI tools into the PDCA cycle for Medical English courses at UMP-HCMC. Both lecturers and students may encounter obstacles in adapting to AI technology, which can affect the effectiveness of AI integration and the overall learning experience.

For lecturers, one of the key challenges is acquiring the necessary technical skills to effectively use AI tools. Many AI platforms require users to have a basic understanding of data analysis, programming, or system integration. This could be particularly difficult for lecturers who are not already familiar with technology, as it may require them to invest time in learning how to use new tools while simultaneously maintaining their regular teaching duties. Additionally, AI can be used to automate or support tasks such as grading assignments, creating exams, or analyzing student feedback, but lecturers must still be able to interpret the AI-generated results and adjust their teaching methods accordingly. This could overwhelm instructors, especially if they are not accustomed to working with data-driven insights.

For students, adapting to AI-driven learning tools also presents challenges. Many students, especially those in the medical field, may not be familiar with or comfortable using AI-based platforms. If AI is used to personalize learning experiences, for instance by recommending tailored study materials or providing real-time feedback on assignments, students may find it difficult to navigate the tools or trust the feedback provided by the AI system. Furthermore, students may experience anxiety if they feel that the AI-based tools are too complex or disconnected from traditional learning methods they are used to. This could lead to resistance or disengagement, affecting the success of the course.

To address these challenges, several solutions can be implemented to help both lecturers and students adapt to AI tools more effectively:

4.3.1. Step-by-step AI professional development for lecturers

UMP should provide comprehensive training programs for lecturers, focusing on both the technical aspects of using AI tools and how to integrate them into teaching. These training sessions could cover topics such as understanding basic data analysis, using AI to interpret feedback, and adjusting course content based on AI insights. Furthermore, ongoing support should be available, either through a dedicated IT team or instructional designers, to assist lecturers as they incorporate AI into their teaching methods. Peer-to-peer learning, where more experienced colleagues mentor those new to AI tools, can also be an effective way to facilitate this transition.

4.3.2. Student-centered support and training

To ensure that students can effectively use AI tools, UMP should offer orientation sessions at the beginning of the course. These sessions could demonstrate how to navigate AI platforms, access personalized learning

resources, and interpret AI-generated feedback. Providing students with detailed guides, video tutorials, or FAQs on using AI tools can reduce anxiety and improve engagement. Additionally, there should be clear communication about the role of AI in the learning process, emphasizing that AI is a supportive tool, not a replacement for instructor feedback.

4.3.3. User-friendly AI tools

One of the best ways to mitigate technical difficulties is to select AI tools that are user-friendly and intuitive. For lecturers and students who may not be tech-savvy, it's important to choose AI platforms that require minimal setup and have simple interfaces. AI tools with built-in support, such as in-app tutorials or customer service chatbots, can further assist users in overcoming technical issues. Many AI platforms, like Quizlet (for flashcards and learning tools) or Grammarly (for writing feedback), offer basic versions that are easy to use and integrate into classroom activities without requiring complex technical knowledge.

4.3.4. Regular Monitoring and Technical Support: Given that technical difficulties are an ongoing challenge, UMP should establish a support system that offers timely technical assistance. A dedicated help desk or IT support team should be available to resolve any issues that arise, whether related to platform access, system integration, or AI-generated feedback. Quick resolution of technical problems will reduce interruptions to the learning process and prevent frustration from building among both lecturers and students.

In conclusion, while technical difficulties are a key challenge in adopting AI tools for Medical English courses at UMP-HCMC, a combination of training, gradual integration, user-friendly tools, and ongoing support can help both lecturers and students overcome these obstacles. By providing sufficient guidance, resources, and opportunities for feedback, UMP can create an environment where AI tools are used effectively to enhance teaching and learning without overwhelming users.

5. CONCLUSION

Integrating Artificial Intelligence (AI) into the PDCA (Plan-Do-Check-Act) cycle at UMP-HCMC offers a transformative approach to enhancing Medical English courses. AI plays a critical role in improving internal quality assurance (IQA) processes and ensuring alignment with AUN-QA Program Level (Version 4.0) standards, meeting both academic and professional expectations. Through its application across all phases of the PDCA cycle, AI helps create a flexible, data-driven framework that continuously adapts the course content and delivery to meet the evolving needs of medical students.

In the planning phase, AI enables more precise curriculum design by analyzing student data, identifying gaps in learning, and ensuring that the course content is aligned with Course Learning Outcomes (CLOs). During the teaching phase, AI supports personalized learning by providing real-time feedback and recommendations to both instructors and students, improving engagement and fostering active learning. In the evaluation phase, AI streamlines the process by automating the analysis of assessments and student feedback, allowing instructors to gain quick insights into course effectiveness. Finally, in the improvement phase, AI aids in refining the course content and teaching strategies based on real-time data, ensuring continuous course enhancement.

AI also enhances the faculty development process by offering insights into teaching effectiveness, supporting ongoing professional growth aligned with institutional quality goals. This ensures that instructors are equipped with the tools they need to improve their teaching methods and ultimately raise the quality of instruction.

By embedding AI into the PDCA cycle, Department of Foreign Languages at UMP can ensure its Medical English courses remain responsive, relevant, and aligned with both academic standards and clinical requirements. The use of AI enables data-driven, continuous improvement, guaranteeing that courses not only meet but exceed quality assurance standards. This approach helps UMP-HCMC prepare students for success in both academic and professional settings.

Furthermore, as AI continues to evolve, AI's applications in Medical English courses at UMP-HCMC can be further expanded. Future research could explore the potential for integrating AI into other medical courses, enhancing learning experiences across various disciplines. For instance, AI tools could be used to support medical students in subjects such as anatomy, pharmacology, and clinical practice by providing interactive simulations, personalized study guides, and real-time feedback on practical skills. Additionally, research into the ethical implications of AI in medical education, such as data privacy and the role of human instructors, will be crucial in ensuring the responsible use of AI. Development efforts could also focus on creating more advanced AI tools that facilitate seamless integration with UMP's existing learning management systems, further enhancing the accessibility and usability of AI across different departments. Ultimately, AI holds the promise of

transforming medical education by making learning more personalized, efficient, and adaptive to the needs of both students and instructors.

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