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## Training Instructors for AI Mastery: A Strategy to Enhance Teaching Quality in the Era of Digital Transformation

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Abstract: In the context of rapid digital transformation, artificial intelligence (AI) has emerged as a key technology with profound impacts on the educational ecosystem. In technical education, it is imperative that faculty members not only utilize AI but also master and co-create with it to enhance teaching quality and foster innovation capacity.

This paper presents an experimental training model aimed at empowering technical faculty with AI competencies, implemented at the Faculty of Fundamental Technical, AD-AF Academy of Vietnam. Unlike conventional, technically heavy training programs, this model is designed as a personalized journey, positioning AI as a "thinking partner" rather than a mere tool. Faculty participants were trained to use platforms such as ChatGPT, Midjourney, Claude AI, HeyGen, and Canva AI in practical scenarios including instructional design, lesson planning, and pedagogical decision-making support.

The model is grounded in three core principles: learning for immediate application, learning through authentic interaction, and learning to integrate cognition with AI tools seamlessly. Based on a pre- and post-training survey of 25 faculty members, results indicated significant improvements in technological proficiency, self-directed learning, critical thinking, and readiness to integrate AI into teaching practices.

These findings underscore the pivotal role of faculty development in advancing a modern digital education ecosystem.

Keywords: Artificial Intelligence (AI), digital transformation in education, faculty training, AI applications in teaching, digital education ecosystem.

#### I. INTRODUCTION

In the digital transformation era, artificial intelligence (AI) has emerged as a foundational technology profoundly reshaping the higher education ecosystem, particularly in technical and STEM fields. Faculty members are increasingly expected not only to use AI tools but to master them - an essential requirement for improving teaching quality, fostering innovation, and meeting learners' growing demand for personalized education [1], [7].

Numerous studies have highlighted AI's potential to enhance learning experiences through functionalities such as content personalization, automated assessment, intelligent instructional design, and adaptive learning support [2], [5], [8]. However, current research remains largely focused on technological aspects or learner behaviors, with insufficient attention given to the pivotal role of faculty in implementing, orchestrating, and co-creating AI-driven educational content [1], [10].

The gap between the rapid pace of technological advancement and faculty readiness poses a significant barrier to effective AI integration in higher education. Many educators remain hesitant or skeptical toward AI-powered educational systems, particularly in the absence of adequate professional development programs [4], [6]. Training faculty to simply "use" AI is no longer sufficient; what is critically needed is empowering them to master the technology, understand its capabilities and limitations, and develop a pedagogical mindset aligned with the digital age [3], [7].

Therefore, it has become an urgent priority to develop AI training models for faculty that are learner-centered, personalized, and rooted in authentic teaching contexts. To be truly effective, such models must address three key challenges: (1) bridging the gap between technology and pedagogy; (2) overcoming distrust in AI-enabled education; and (3) providing sustained professional support.

In this context, this paper presents an experimental faculty development model implemented at the Faculty of Fundamental Technical, AD-AF Academy of Vietnam. The model adopts a "thinking partnership" approach to AI, grounded in three core principles: (1) learning for immediate application—to bridge the gap between technology and pedagogical practice; (2) learning through authentic interaction - to build trust through guided experience; and (3) learning to integrate cognition with tools - to cultivate a digital pedagogical mindset. The model aims to transform faculty roles from knowledge transmitters to designers of AI-integrated educational content [6], [8], [9].

#### II. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

#### 2.1. Theoretical Framework

## a) Artificial Intelligence as a "Cognitive Partner" in Technical Teaching and Learning

Amid profound digital transformation, AI is evolving from a mere support tool to a "co-creator of knowledge" in teaching and learning processes. In technical education - a field that demands logical reasoning, simulation capabilities, and complex problem-solving - AI can serve as a "cognitive partner" for both educators and learners [1], [7].

With its capacity for natural language processing, data synthesis, technical simulation, and flexible content generation, AI supports faculty in designing personalized lessons, implementing flipped classrooms, integrating STEAM models, and developing learner-paced materials. This perspective inspires a pedagogical shift—from linear instruction to flexible learning design; from tool usage to technology collaboration [1], [8].

#### b) Digital Competency Framework for Technical Faculty

To adapt to their evolving roles in digital environments, faculty members must be equipped with comprehensive digital competencies. According to the DigCompEdu framework (European Commission, 2017) and recent studies [2], [5], [8], these competencies include:

Technical competence: proficiency in using digital platforms (e.g., LMS, simulation software, AI tools);

Design competence: ability to develop digital learning materials and interactive and personalized content;

Analytical competence: using learning analytics to inform and adapt teaching strategies;

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Digital pedagogical competence: facilitating and reflecting on learning processes in technology-enhanced environments.

However, in practice, a significant gap persists between the demands of digital transformation and the current skill levels of faculty - referred to as the "digital transformation gap." This gap presents a growing challenge in higher education.

#### 2.2. Literature Review

#### a) Existing AI Training Models for Faculty

Educational institutions both in Vietnam and globally have implemented various AI training models for faculty, which can be broadly categorized into three main trends:

Tool-based skill development models: These focus on training faculty to use AI platforms such as ChatGPT, Canva AI, and Midjourney. While accessible and easy to implement, these models often emphasize operational skills, lacking depth in pedagogical thinking.

AI-integrated teaching models: These aim to embed AI tools into lesson delivery, assessment, and classroom management. Such models are practical but tend to position AI as a supporting tool rather than a co-creator in the learning process.

Experiential and content co-creation models: These encourage faculty to engage in personalized projects and develop real-world learning materials. Although they promote deeper pedagogical thinking, they remain relatively uncommon and lack systematic frameworks for evaluating effectiveness [6], [9].

This overview indicates that most existing models remain at the level of "using AI" as a technical tool. Few aim to develop the deeper capability of mastering AI - i.e., the ability to think critically with AI, make pedagogically responsible decisions, and co-create content tailored to the specific needs of technical disciplines.

### b) Research Gaps and the Need for a New Model

Although many studies have examined the role of AI in personalized learning and learner support [2], [5], [10], there is a notable lack of research focusing on the capabilities of technical educators to design, implement, and reflect on AI-enhanced instruction. In particular, there is no existing model that systematically connects the development of digital competencies with the transformation of faculty roles - from content transmitters to learning designers who co-create with AI.

Therefore, there is a pressing need for a new faculty development model that is educator-centered and emphasizes the cultivation of:

AI-integrated instructional design thinking;

Digital content creation aligned with practical teaching contexts;

Self-directed learning and adaptability to technological change.

Building on this need, the present study proposes and experimentally implements a faculty training model aimed at enabling technical educators to master AI, conducted at the Faculty of Fundamental Technical, AD-AF Academy of Vietnam. Detailed descriptions of the model are presented in the following sections.

## III. FACULTY TRAINING MODEL FOR AI MASTERY

## 3.1. Design Philosophy and Competency Orientation

The AI mastery training model for faculty is grounded in three foundational principles: structural minimalism, experiential elegance, and pedagogical innovation. Rather than merely equipping instructors with operational skills, the model emphasizes the development of competencies for integrating AI creatively, ethically, and effectively into teaching practices.

In contrast to tool-centric or highly technical programs, this model is built upon a digital pedagogy competency framework with AI, encompassing three main domains:

AI Awareness in Education: Understanding the nature, role, and impact of AI on the teaching profession.

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Practical Application of AI in Teaching: Effectively integrating AI tools into lesson planning, instruction, and assessment.

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Pedagogical Innovation with AI: Designing personalized learning models and instructional content while engaging with AI in an ethical and reflective manner.

## 3.2. Competency-Based Program Structure

The model is structured into three progressive phases of digital pedagogical competence development:

**Phase 1** – Raising Awareness

Objective: To build foundational understanding of AI, its opportunities, and challenges in education.

Methods: Case-based discussions, real-world application analyses, and experiential use of conversational AI tools (e.g., ChatGPT, Claude AI) in simulated classroom scenarios.

Competency Outcome: Ability to analyze educational contexts and identify the potential roles of AI in one's own discipline.

Phase 2 - Applied Integration

Objective: To equip faculty with practical skills in using AI platforms for instructional design, teaching activities, and assessment strategies.

Methods: Project-based learning, hands-on practice through specialized modules (e.g., AI-powered lesson planning, digital content creation, automated feedback generation).

Competency Outcome: Ability to select appropriate tools and integrate them into pedagogical plans while ensuring personalization and instructional quality.

Phase 3 - Innovation and Transformation

Objective: To cultivate innovative thinking and produce personalized teaching solutions using AI.

Methods: Project-based learning, personalized mentoring, and peer product reviews.

Competency Outcome: Creation of innovative educational products (e.g., learning chatbots, AI-generated rubrics, adaptive learning modules) with the potential for dissemination and scalability.

## 3.3. Principles for Using AI Tools and Platforms

Rather than introducing a broad array of tools, the program emphasizes the development of criteria for selecting AI tools that align with the specific characteristics of the subject being taught. These criteria include:

Ease of use: preference for zero-code or low-code tools;

Pedagogical integration: the ability to meaningfully embed the tool into instructional processes;

Data safety and ethical use: compliance with ethical standards and data protection principles.

Representative categories of tools are illustrated as follows:

Conversational AI: ChatGPT and Claude AI - assist with content design, learning support, and lesson preparation.

Instructional design AI: Canva AI, Gamma App, and Runway ML - used for generating slides, instructional videos, and animated visual materials.

Learning management and assessment AI: Notion AI, Perplexity, Poe - support organizing course content, providing rapid feedback, and personalizing instruction.

For example, a technical faculty member may use Canva AI to create an infographic explaining a robotic operation process and ChatGPT to generate scenario-based critical thinking questions for students.

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## 3.4. Training Implementation Methods

The program is delivered through a combination of three main instructional formats:

Hands-on workshops: Tool-oriented sessions focused on active learning through practical engagement.

Project-based learning: Faculty design instructional products directly related to their teaching disciplines.

Peer review: Participants critique one another's work to promote reflection, iterative improvement, and the dissemination of ideas.

The training emphasizes personalized learning and practical application rather than grades. Each participant is required to complete a final AI-integrated educational product - such as a digital lecture, virtual learning assistant, or adaptive learning module - as tangible evidence of their AI mastery.

#### IV. RESEARCH METHODOLOGY AND EXPERIMENTAL IMPLEMENTATION

#### 4.1. Implementation Unit and Participant Profile

The experiment was conducted at the Faculty of Fundamental Technical, AD-AF Academy of Viet Nam, which is responsible for teaching foundational engineering modules in the academy's engineering education program. Participants consisted of technical faculty members who were directly teaching measurement and control-related subjects and had expressed a need to update and innovate their teaching practices through the integration of AI technologies.

Selection criteria for participants included:

Demonstrated interest in enhancing digital competencies and pedagogical innovation;

Willingness to participate in experimental learning and explore new AI tools;

Openness to collaboration, sharing, and peer feedback through discussions and learning journals.

The projected cohort consisted of 20 faculty members, divided into 5 small groups to facilitate teamwork, peer review, and personalized technical support. Each group was mentored by a team of technical advisors and pedagogical experts, who provided continuous guidance and problem-solving throughout the training and project phases.

## 4.2. Research Design

The study adopted an action research methodology, aiming to address the practical challenge of enhancing AI competencies among faculty through iterative cycles of experimentation, reflection, and refinement. The research was structured into three key phases:

**Initiation:** Tool Familiarization

Participants were introduced to widely used AI platforms such as ChatGPT, Claude AI, Teachable Machine, and Notion AI through short hands-on activities. This phase aimed to build foundational confidence and tool fluency.

**Application:** AI-Enhanced Lesson Design

Faculty selected a topic from their area of expertise and developed AI-integrated instructional materials using tools such as Canva AI, Gamma App, HeyGen, etc. Deliverables included slide decks, explanatory videos, learning support chatbots, or simulations of technical systems.

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**Project:** Based Implementation

Participants implemented their "AI-enhanced" lesson in a simulated classroom environment. The implementation was supported by mentors and included peer review cycles to promote critical reflection and iterative improvement. Final products were presented, reviewed, and revised across multiple rounds.

#### 4.3. Implementation Procedure and Timeline

The experimental process was carried out over four intensive workshops, combining group work with individualized project development. Rather than following a traditional lecture format, the workshops emphasized hands-on learning, creativity, and flexible support. The process was structured as shown in Table 1.

**Table 1: Experimental Implementation Timeline and Activities** 

Session	Main Content	Objectives	Technical & Mentoring Support
		and explore their potential applications in technical disciplines	Guided demonstrations and orientation for effective tool utilization
Session 2	Designing AI-integrated teaching materials (slides/videos/chatbots) by topic	Apply AI in the process of instructional material development	In-depth support with Canva AI, Gamma App, and HeyGen
	Implementation of simulated classroom models and peer evaluation		guidance for product enhancement
Session 4	and wrap-up	Collect research data, summarize outcomes, and propose improvements	Standardized evaluation by review panel and quality assessment

Organizational Approach: The program emphasizes reduced theoretical overload and increased hands-on engagement. It promotes personalized support, self-directed learning, critical reflection, and collaboration. Each faculty member is encouraged to freely choose tools and define their own creative direction.

#### 4.4. Data Collection and Analysis Methods

Data were collected using both qualitative and quantitative approaches to ensure reliability and a multidimensional assessment of the model's effectiveness.

## a) Qualitative Analysis

Content analysis of teaching products: Evaluation focused on creativity, feasibility, pedagogical relevance, and the level of AI integration in the instructional designs produced by participants.

Learning journals and descriptive feedback: Analysis of reflections on learning experiences, challenges encountered, motivational factors, and shifts in professional thinking among lecturers.

In-depth interviews: Conducted with selected exemplary lecturers to explore their learning experiences, practical application capabilities, and the potential for scaling the model.

## b) Quantitative Analysis

Pre- and post-training surveys using a 5-point Likert scale, assessing the following criteria:

Confidence in applying AI in teaching;

Awareness of personal digital competencies;

Attitudes toward pedagogical and technological innovation;

Collaboration and teamwork skills in digital environments.

Data were encoded and processed using specialized analysis software (e.g., Excel, NVivo) to enable comparisons, detect relationships between training components and learner transformation, and identify underlying patterns. The analysis results

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provide a scientific basis for evaluating the model's effectiveness and offer insights for improving future faculty development programs in the context of digital education.

#### V. RESULTS AND DISCUSSION

## 5.1. Changes in Faculty Perception and Skills

Following the implementation of the training and experimental activities, survey and interview results indicated a significant positive shift in faculty members' perceptions and skills related to AI application in teaching:

Perception: Participants demonstrated a clearer understanding of the role and potential of AI in education, particularly in designing personalized learning activities, creating digital content, and facilitating automated assessment.

Skills: Faculty members became more proficient in utilizing AI tools such as ChatGPT, Canva AI, Gamma App, HeyGen, and Synthesia to design lesson plans, produce instructional videos, create interactive slides, and develop question banks.

Quantitative indicators: According to Likert scale results, the average score for self-confidence and ability to design AIintegrated lesson plans increased significantly - from 2.4 to 4.1 on a 5-point scale - after the training sessions.

#### **5.2.** Examples of Representative Teaching Products

Several noteworthy products were developed by faculty members during the training and practice phases:

AI-Integrated Lesson Plans: Some sample lesson plans were developed following project-based learning models, integrating ChatGPT to assist learners with information retrieval, summarization, and practice activities.

Short Instructional Videos: Tools such as Synthesia and HeyGen were employed to produce brief instructional videos featuring virtual lecturers, with accessible content tailored for self-paced learning environments.

Interactive Slides: Faculty utilized Canva AI and Gamma App to create engaging presentations enriched with quick quizzes, mind maps, short videos, and animated illustrations - enhancing interactivity and visual comprehension.

These outputs were highly rated during peer review activities, showcasing faculty members' practical application and creative use of AI tools following the training and technical support phases.

Table 2. Descriptions and Illustrations of Representative Teaching Products

Product	Brief Description	
A1. AI-Integrated Lesson Plan	Project-Based Learning (PBL) lesson plan incorporating ChatGPT: learners use AI to search	
A1. A1-Integrated Lesson Flan	for information, outline content, develop ideas, and write technical reports.	
A2. Short Instructional Video	A 3–5-minute video generated using HeyGen/Synthesia, featuring a virtual instructor avatar;	
A2. Short instructional video	includes introduction, content explanation, summary, and quick assessment questions.	
A3. Interactive Slides	Slides designed with Canva AI/Gamma App, integrating quizzes, mind maps, illustrative	
A5. Interactive Sides	videos, and "choose-your-own-path" navigation to enhance learner engagement.	

**Table 3. Product Evaluation Rubric** 

Criteria	Description	Score Scale (0-4)
Creativity	Degree of novelty in the idea and AI application format	0: No innovation 1: Slightly creative 2: Moderately creative 3: Good creativity 4: Highly innovative
Practical Applicability	Alignment with instructional goals and ease of implementation	0: Not applicable 1: Difficult to apply 2: Partially applicable 3: Well applied 4: Highly practical
Pedagogical Quality	Clarity, logic, and instructional support in the structure of lesson/slide/video	0: Disorganized 1: Poorly structured 2: Moderately clear 3: Well-structured 4: Exemplary pedagogical coherence
AI Integration Level	Extent to which AI is embedded in the activity—not just as a tool but as a co-creator	0: Only used as a tool 1: Minimally integrated 2: Moderately integrated 3: Well integrated 4: Co-creative AI implementation
Learner Experience	Degree of interactivity, personalization, and engagement in the product	0: Non-interactive 1: Minimally interactive 2: Moderately engaging 3: Highly engaging 4: Exceptionally interactive and personalized

**Rubric Guidelines:** 

Each product is scored based on the five criteria above. The maximum total score is 20 points.

Products scoring  $\geq$  16 points: Are rated as Excellent 12 - 15 points: Good 8 - 11 points: Fair

< 8 points: Needs Improvement

#### 5.3. Program Effectiveness Analysis

## 5.3.1. Pre- and Post-Training Comparison of Faculty Competencies

To evaluate the effectiveness of the training program, the research team conducted pre- and post-surveys among participating faculty members. The assessment focused on core competencies, including:

The ability to integrate AI technologies into lesson design,

The ability to organize personalized learning activities, and

The ability to use digital tools to create instructional content (e.g., videos, slides, simulations).

Results:

Prior to the program, only 20–25% of faculty members reported confidence in applying AI in their teaching. After the program, this figure rose to over 80%.

Many participants had no prior experience integrating videos or using virtual instructors in their lessons; post-training, over 70% were able to produce complete instructional products.

Critical evaluation and peer-review skills were also enhanced through structured peer-review activities utilizing clear rubrics.

## 5.3.2. Feedback on Workshop Quality and Creative Engagement

- Feedback from participating faculty indicated that:

96% rated the program as "aligned with practical teaching needs."

92% felt it "stimulated creative thinking."

Many suggested institutionalizing this model to foster a continuous professional learning community.

- Key elements praised by participants included:

Learning by doing,

A respectful and flexible learning environment,

High applicability and immediate relevance to classroom practice.

#### 5.4. Comparison with Other Models and Lessons Learned

## 5.4.1. Comparison with Traditional Training Models

Table 4. Comparison between Traditional Training Models and the "AI Mastery" Model

Criteria	Traditional Training Model	AI-Integrated, Project-Based, and Reflective Model
Instructional Approach	Transmission–Reception	Experiential, Practice-Oriented, and Creative
Learner's Role	Passive listening and note-taking	Active engagement through hands-on practice, critical thinking, and product creation
Support Tools	Primarily PowerPoint and whiteboard	AI tools (e.g., ChatGPT, Canva, Synthesia) and digital design platforms
Transfer Effectiveness	Limited applicability in real-world teaching	Directly applicable to practical teaching contexts

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#### 5.4.2. Lessons Learned

Select simple and accessible AI tools: There is no need for complex software. With clear, step-by-step guidance on how to apply each tool, instructors can effectively integrate AI into their teaching practices.

Implement experiential learning models: Training programs based on experiential learning enable participants to undergo genuine transformation in both cognition and behavior.

Integrate Workshop-Project-Peer Review approaches: This combination fosters creativity, builds a collaborative learning community, and sustains long-term motivation among participants.

Avoid overemphasis on technological theory: Rather than focusing heavily on technical aspects, training should prioritize nurturing instructors' pedagogical creativity and teaching capacity.

#### VI. CONCLUSION AND RECOMMENDATIONS

#### 6.1. Conclusion

The training program aimed at empowering technical faculty with AI competencies has demonstrated significant effectiveness in enhancing their capacity to design, implement, and evaluate technology-integrated teaching practices. Through practice-oriented modules such as workshops, project-based learning, and peer review, participants not only gained access to modern AI tools but also proactively applied them to develop instructional materials, create educational videos, and design digital content aligned with the goals of digital transformation in education.

Pre- and post-program assessments indicated marked improvements in awareness, technological proficiency, and creative engagement in professional teaching activities. The teaching products developed during the program were highly applicable and received positive feedback from peers, students, and educational administrators alike.

#### 6.2. Recommendations

Develop a competency framework for AI in technical education: It is essential to establish a standardized, up-to-date AI competency framework tailored to specific disciplines. This framework should serve as a foundation for designing training programs and conducting performance evaluations.

Promote professional development policies for AI integration: Institutions should implement supportive policies that provide financial assistance, time allocation, and formal recognition of AI-related training outcomes, especially in technical, vocational, and STEM education.

Integrate AI into teaching assessment and academic management: The adoption of AI-powered systems for evaluating faculty performance should be encouraged to enhance transparency, objectivity, and timeliness in recognizing professional competencies.

Foster university – industry - AI organization collaboration models: Strengthening partnerships with technology enterprises will facilitate access to cutting-edge tools, provide real-world training opportunities, and support the development of a sustainable digital transformation ecosystem for faculty.

#### 6.3. Future Research Directions

Long-term impact evaluation: Further studies should assess the long-term effects of such training programs (1 - 3 years post-training) on teaching practices, technological adaptability, and student learning outcomes.

Model expansion to other disciplines: Based on initial success, the AI-empowerment model should be extended to other fields, including the social sciences and humanities, to promote comprehensive digital literacy across the higher education system.

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Development of personalized AI-enhanced learning platforms for faculty: Future efforts should focus on building intelligent learning environments that offer personalized content, tool recommendations, progress tracking, and continuous professional development tailored to faculty needs.

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