

## Artificial intelligence competencies of vocational teachers using for the design of learning activities

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### Article Info

#### Article history:

Received Aug 4, 2024

Revised Dec 5, 2024

Accepted Mar 1, 2025

#### Keywords:

Artificial intelligence

ICT competency

Learning activities

Questioning method

Vocational teacher

### ABSTRACT

Currently, information technology used in teaching and learning management is constantly evolving. Therefore, the development of vocational teachers' artificial intelligence competencies (AIC) of vocational teachers using artificial intelligence (AI) for the design of learning activities using questions is to develop the ability to use information technology in teaching and learning management with an emphasis on the use of AI for education. Teachers in the college received practical training on the application of AI in teaching and learning management. In using AI, which creates knowledge and understanding for teachers, it can be applied in the design of learning activities. From allowing teachers to practice, this has a positive effect on the increase in AI skills of teachers from before attending the training. Overall, vocational teachers have a great level of AIC; the average score is 21.72 points and from the assessment of overall satisfaction at the highest level. The training content is suitable for the current situation. The knowledge gained can be used to benefit in organizing teaching activities. The speakers have interesting teaching techniques.

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## 1. INTRODUCTION

The Ministry of Education has unveiled the Education Policy of the Ministry of Education [1], which intends to assist learners of all ages to grow in every dimension, including opportunity. Equality, quality, and key capabilities are required in the context of the country and global society. This will involve revamping education and establishing a society of lifelong learning, as well as increasing students' access to a diversity of educational options. Suitable for the knowledge, interests, and aptitudes of learners of all ages [2]. Being morally and ethically prepared for current economic, social, and political developments give priority to the quality of instructors across the country.

According to Office of the Vocational Education Commission [3], a reform strategy for vocational education has been developed, as have recommendations for its development. In accordance with professional development, to generate and develop workforce in response to the demands of community organizations [4] the job market and self-employment are suitable [5], [6]. Nakornluang Polytechnic College, it is described as a

learning environment that provides both structured and unstructured training. The system will represent residents and students, but those in need- such as the disabled or incarcerated- will be represented outside of it.

Therefore, learning management for instructors in the twenty-first century entails developing knowledge and training until they are proficient in both teaching and learning [7]; capable of completing the teaching efficiently. This permits kids to study effectively. Teachers educate with precision, minimizing academic learning and focusing on improving learning skills. The instructor will enter questions in a variety of methods that will help the student build their thinking skills, so that they can apply analytical reasoning [8]. To respond to these questions, synthesize or analyze. In addition to obtaining academic material, it enables learners to find learning for themselves and to build critical thinking abilities. Instructors must make time to create study materials. Questions that assist inspire learners in the correct way [9], [10].

Artificial intelligence (AI) is now a digital technology that is widely used by both government and private sector businesses to improve their work, solve issues, and make smart judgments. We name these processes AI. Today, AI technology is applied in educational management. Improve teaching and learning experience [11], [12]. It helps to produce material for better teaching and learning, and it also benefits every student [7], [9].

In the digital age, it is not just about the possibility of using technology in teaching and learning, but it is important that teachers are prepared to integrate digital technology into learning management [13]. To organize and assist successful teaching and learning in the twenty-first century, educators need to possess a solid understanding of technology [14], who can develop and master new technologies and techniques; and always want to learn new things. Utilizing technology, choose current information, and reference resources to broaden the knowledge while adhering to the principles of learning management. Technology may be utilized in many ways [15], such as creating educational materials and electronic media to provide students with incentives, as well as exchanging knowledge to foster creativity and improve effectiveness and efficiency. It should be proficient in technology and capable of producing, distributing, and using knowledge [16]. Teachers in the twenty-first century should use technology to turn students become thinkers and developers [9].

In accordance with the ideas and concepts, the study team's concept is to employ AI to create question-based learning activities, which will help vocational teachers become more proficient in AI. It serves as a guide to help instructors develop AI abilities, so they may create thinking processes that enable them to create teaching and learning activities at any time anyplace; utilize AI technologies to build and analyze utilizing internet-connected devices. This occasion the research was done with the following objectives: i) analyze and synthesize the conceptual framework for developing vocational teachers' artificial intelligence competencies (AIC) in designing learning activities; ii) create a methodology for training vocational teachers in AI; iii) assess the proficiency of vocational teachers in AI; and iv) analyze the level of satisfaction among vocational teachers who have undergone training in AIC.

## 2. METHOD

AIC of vocational teachers using for the design of learning activities. It was created using the ADDIE model [17] teaching and learning system design principles, and is broken down into parts, one of which is the analysis, design, development, implementation and evaluation. The two phases of the research methodologies are consistent with the research and may be categorized as phase 1 and phase 2. Phase 1 examines the model for creating learning activities that require AIC in vocational teachers and creates the model for doing so.

- Examine, evaluate, and compile relevant research and documentation.
- Creating a model for the AIC of vocational teachers using for the design of learning activities.
- Assess the model's applicability for helping the AIC of vocational teachers using for the design of learning activities.

Phase 2 conducts experiment for create learning activities using the model AIC of vocational teachers.

- Assess the vocational teachers' competency using AI.
- Assess the satisfaction of teachers of vocational education.

### 2.1. Research analysis

Reviewed, analyzed, and synthesized pertinent literature and research is: i) establish the methodology for the study; ii) the purpose of the research the creation of a model for the AIC of vocational teachers using for the design of learning activities; iii) the sample group used was obtained by simple random sampling from the educational staff of Nakornluang Polytechnic College, Bangkok, Thailand; iv) gathering data for a study by looking through books and research articles and other pertinent documents. Theses, research papers, publications in academic journals, and electronic media; v) combine information from document analysis and relevant studies. In the style of document analysis, it evaluates and synthesizes information from document studies and associated research.

## 2.2. Research design and instrument

Creating a model for the AIC of vocational teachers using the design of learning activities. A method of learning through document synthesis has been created by the researcher. The conceptual framework for development, which emphasizes systematic components, procedures, and stages, is derived from related research, and display their partnership. Take it to five specialists to assess the created procedure after that, research and data collecting instruments include the following:

- Assessing AIC of vocational teachers using for the design of learning activities utilizing an evaluation form. Experts in instructional design have created five different levels of questions (mathematics and information technology).
- The methodology developed by AIC of vocational teachers using for the design of learning activities is evaluated for quality. Experts in curriculum design have posed questions at five different levels, as well as information technology.
- Evaluation of vocational teachers' AIC, it is an assessment based on the current circumstances. Rubric score using analytics, one component or segment at a time grading is accomplished using rubrics. Next, to get the overall score, sum the points from each component. The evaluation, which is based on actual situations, uses a 4-level scale for scoring purposes.

## 3. RESULTS AND DISCUSSION

### 3.1. Questioning method

Phase 1 examines the model for creating learning activities that require AIC in vocational teachers and creates the model for doing so. Research, analysis, and synthesis of documents, data, and related research through the application of document analysis to the analysis and synthesis of data gleaned from the examination of documents and related research. Table 1 provides a thorough representation of the findings from the questioning method's analysis and synthesis of the learning process.

The learning management process utilizing the questioning method may be condensed from Tables 1 and 2 into the following six steps:

- Step 1 (planning questions): during this phase, the instructor should arrange ahead of time how the questions will be utilized. What structure or methodology will be appropriate given the lesson's focus and topic matter?
- Step 2 (framing questions): the questions that will be utilized in the learning exercises should be prepared by the teacher. By formulating inquiries with instructions.
- Step 3 (using questions): in addition to using pre-prepared questions, the teacher is free to generate new ones at any point throughout the learning session. However, it needs to be appropriate for the setting and subject matter, for example, while making teaching slides, e-learning classes, coding, worksheet images, and instructional games.
- Step 4 (waiting time): a step where students should have a certain amount of time to consider their response to the question after the teacher poses it.
- Step 5 (summarizing): the process of reviewing the lesson by summarizing it.
- Step 6 (evaluating): a collaborative assessment of learning outcomes by students and teachers.

Table 1. Questioning method

| İnönü [18]                | Józsa <i>et al.</i> [19]                                                | Saleh and Albondog [20]                                                  | Kampirapawong and Ruangnak [21] | Hankuttum <i>et al.</i> [22] | Synthesis results  |
|---------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------|------------------------------|--------------------|
| Ask planned questions     | Gain clarity about the question                                         | Using questioning positively                                             | Planning the use of questions   | Plan the use of questions    | Planning questions |
| Waiting time              | State the question                                                      | Framing questions                                                        | Question preparation stage      | Prepare questions            | Framing questions  |
| Listening to the response | Leave adequate time for students to think about and formulate an answer | Using wait times                                                         | Question stage                  | Use questions                | Using questions    |
| Assessing the response    | Ask only one question                                                   | Using positive prompting                                                 | Summary and evaluation stage    | Summary and evaluation       | Waiting time       |
| Ask follow-up questions   | Ask questions in an easy-to-difficult sequence                          | Handling incorrect responses                                             |                                 |                              | Summarizing        |
| Questions                 |                                                                         | Data analysis data analysis, interpretation<br>Discussion of the results |                                 |                              | Evaluating         |

Table 2. Synthesis of questioning method

| Questioning method | İnönü [18] | Józsa <i>et al.</i> [19] | Saleh and Albondog [20] | Kampirapawong and Ruangnak [21] | Hankuttum <i>et al.</i> [22] |
|--------------------|------------|--------------------------|-------------------------|---------------------------------|------------------------------|
| Planning questions | ✓          | ✓                        | -                       | ✓                               | ✓                            |
| Framing questions  | -          | -                        | ✓                       | ✓                               | ✓                            |
| Using questions    | ✓          | ✓                        | ✓                       | ✓                               | ✓                            |
| Waiting time       | ✓          | ✓                        | ✓                       | -                               | -                            |
| Summarizing        | -          | -                        | -                       | ✓                               | ✓                            |
| Evaluating         | ✓          | -                        | -                       | ✓                               | ✓                            |

Figure 1 shows the model of developing AIC of vocational teachers using for the design learning. In total, there are three components. The following is an explanation of: component 1 (input); component 2; and component 3 (output). Component 1 includes the following components or form-related items:

- Digital teacher, the following nine sorts of qualities are expected of instructors in the twenty-first century and should be evident in teaching and learning: i) Experience: educators ought to develop and acquire new technology and tools, including the internet; ii) Expanded: educators ought to continuously pursue new information. Utilize leisure time wisely by using technology for study and information acquisition; iii) Expanded: to enhance knowledge that benefits the public, educators should broaden their areas of expertise; iv) Exploration: instructors ought to choose and do subject-matter research. current, evidence-based materials to foster innovation in the advancement of instruction; v) Evaluation: instructors must be skilled assessors. Since not all technologies are suitable for all types of learning, technology is utilized to assess and accommodate the learning style; vi) End-user: teachers should be proficient in a range of technologies and capable of using them as end users, such as browsing websites and other online content; vii) Enabler: to increase student motivation, educators should be able to develop lessons and media in electronic format using hardware, software, and technology; viii) Engagement: educators who collaborate and share knowledge to spark original thought; and ix) Effective and efficient: to be proficient with technology.
- Information and communication technology (ICT), basic understanding that teachers must possess in the twenty-first century considering contemporary technologies which are separated to [23]–[26]: i) Basic hardware and software features, such as device locking, charging, and off or managing user accounts and passwords changing privacy settings; ii) Knowledge of information and data: the capacity to investigate, locate, evaluate, and work with digital content, data, and information; iii) Interaction and cooperation, it is a dialogue. Digital technology for information sharing online etiquette and digital identity management; iv) Unique online material it involves producing, compiling, and authoring fresh digital content. Understanding copyright and licensing, as well as programming expertise; v) Safety can protect equipment, personal information, health, happiness, and even the environment; vi) Problem-solving techniques are used to address technical difficulties, figuring out the needs and remedies for technology ability to employ digital technology in an inventive way determining the differences between digital competency and computational thinking; and vii) Competencies relevant to the job having the skills and knowledge necessary to operate certain hardware and software for specialized fields, such as designing hardware and software or using learning management systems create a course that is partly or fully online.
- The essence of AI to provide more engaging media for learning and teaching [27]. It comes in the following three forms: i) AI for text editing refers to the use of text format data processing through various applications, including the ability to create articles, administer tests, and read Thai and English text off the page, including features for recalling Q&A; ii) AI for image editing is the process of using AI to produce images from text for public use by inputting words or a command that will be utilized to produce a picture; and iii) Using AI to create presentation slides is known as AI for presentation.

In component 2, there are six steps in the questioning method, which are: i) planning questions; ii) framing questions; iii) using questions; iv) waiting time; v) summarizing; and vi) evaluating. Furthermore, component 3 (output), learning management outcomes as determined by the approved model. The use of AI competency is a skill that is acquired by practical evaluation utilizing the rubric score evaluation, which is composed of three measuring aspects: decision, usage, and assessment. The evaluation is conducted by seeing how AI is used with 6-step questions. The researcher's prepared teaching style is used to gauge the level of satisfaction among vocational teachers.

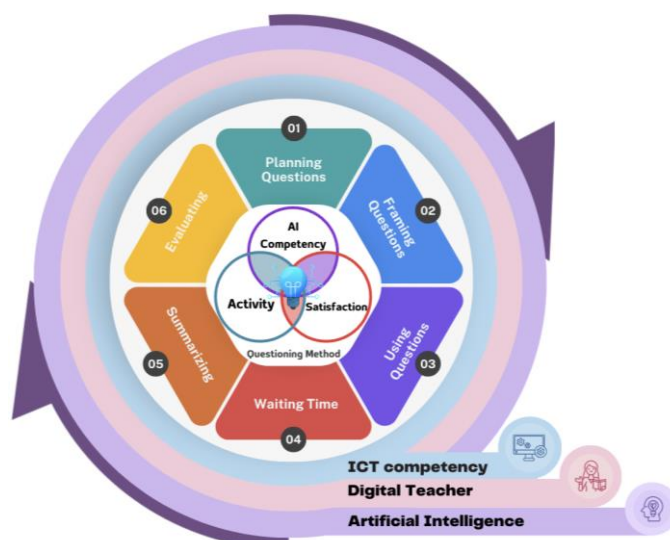


Figure 1. The model for AIC of vocational teachers using for the design of learning activities

Assessment of the appropriateness of developing the AIC of vocational teachers using for the design of learning activities is an assessment using the characteristics of a questionnaire as a rating scale of the Likert scale by answering according to five levels of opinion, as shown in Table 3 by passing an assessment from experts in the university's profession, colleges, and schools. There are the field of mathematics in the field of statistical calculation, the field of teaching and learning design in the field of organizing learning activities, and the field of information technology in the field of technology used.

Table 3. Mean score range and interpretation of results

| Range of average score | Interpretation of suitability |
|------------------------|-------------------------------|
| 4.50–5.00              | Highest                       |
| 3.50–4.49              | High                          |
| 2.50–3.49              | Moderate                      |
| 1.50–2.49              | Low                           |
| 0.00–1.49              | Lowest                        |

The evaluation of the AIC model for vocational education teachers in designing learning activities showed a high level of effectiveness, with an average score of 4.50. Experts rated the specific components of the model even higher, with an average of 4.59, indicating strong support for AI integration in teaching. This suggests that the model is highly relevant and beneficial for enhancing teachers' abilities to design effective learning activities. The results highlight the importance of AIC in vocational education and their potential to improve teaching quality. The model provides a solid foundation for integrating AI into vocational education practices.

The AIC assessment of vocational teachers used rubric scores, and the findings came from the expert quality assessment analysis of the AIC evaluation. The researcher's AI competency assessment yielded an average quality score of 0.95, suggesting that by leveraging AIC of vocational teachers using for the design of learning activities.

- Assessment of vocational teachers' satisfaction with AIC of vocational teachers is used for the design of learning activities. The evaluation of experts' quality assessments in relation to the satisfaction survey form, the assessment's average quality is 0.88. It can be applied to gauge contentment to the development of AIC of vocational teachers using for the design of learning activities.

### 3.2. Artificial intelligence competency of vocational teachers

Phase 2 conducts experiment for create learning activities using the model AIC of vocational teachers. AIC assessment of vocational teachers is conducted with rubric score. The AIC evaluation's expert quality assessment supports analysis's findings. The AI competency assessment yielded an average score of 0.95, indicating that vocational teachers demonstrated a high level of proficiency in designing AI-based learning activities. The evaluation of vocational teachers' AI competence in creating educational

activities with AI is also measured. The presentation was divided among the 29 participants into the data analysis findings. Vocational teachers who utilize AI to create learning activities with questions have extremely good outcomes when it comes to the assessment of their AI proficiency. From the performance evaluation of AI, when considering the overall average result, the assessment had a score threshold of 21.72 points, and a total of 24 points.

### 3.3. Satisfaction of vocational teachers

This study assesses vocational teachers' satisfaction with the AIC used in designing learning activities. The evaluation of experts' quality assessments in relation to the satisfaction is collected from survey form. The assessment's average quality is 0.88. These findings indicate that the satisfaction scale employed by the researcher is suitable for evaluating participants' perceptions of the training effectiveness. It can be applied to gauge contentment to the development of AIC of vocational teachers using for the design of learning activities. Evaluation of vocational teacher satisfaction with their AIC growth when they utilize AI to create question-based learning activities. When examined separately, the total mean was at the highest level, indicating that the training material is appropriate for the circumstances at hand and that the information acquired may be put to good use in instructional activities. The most satisfying thing to them was the use of engaging instructional methods. It shows that participants are encouraged to apply their thoughts appropriately and gain the knowledge.

The teachers who attended this training were interested and excited about the use of AI technology in the design of learning activities. This creates a neat and fun atmosphere in the training, which leads to an increase in the development of AI skills. It is in line with the findings of Sun *et al.* [28], which shows that students find learning using knowledge-guided activities along with Socrates' questioning approach is satisfying. The process of organizing the activity helps to increase critical thinking skills. It is possible to distinguish the necessary parts, which is consistent with Kampirapawong and Ruangnak [21]. Although the training was well received, the actual enhancement of AI competencies differed among participants, potentially due to disparities in technological familiarity and institutional support. Because, in some organizations, technology has begun to be used in teaching and learning management. Consequently, research by Sridam *et al.* [29], who is the implementation of AI policies becomes a crucial factor in educational management strategies, playing a pivotal role in upgrading educational quality and extending opportunities in the modern world. In line with Gkinko and Elbanna [30], research on AI has found that this technology can learn, develop, and grow to better suit the context of users and organizations.

The students showed great overall satisfaction and were able to adapt new activities. There was a great deal of satisfaction as new activities were introduced that would allow activities to interact more with learners in the classroom. The learning management is based on the developed learning process. The most important thing in applying AI in education is to be able to be an assistant who facilitates teaching and learning. Activities during classes or even student evaluations should also cultivate ethics in the use of AI, this is supported by Su and Yang [31]. An appropriate learning environment should be provided. It was found that teachers who did not bring computers/notebooks cannot perform effectively. Therefore, teachers must bring a computer/notebook. For the convenience of activities, there should be additional video materials for teachers to use in the next learning.

## 4. CONCLUSION

The researcher described the research using the following methodologies: phase 1 examines the model for creating learning activities that require AIC in vocational teachers and creates the model for doing so. Based on the six steps that the researcher synthesized by questioning method, the learning process was built with three components (input, process, and output). The highest ratings resulted from the assessment AIC of vocational teachers using for the design of learning activities developed generally. Phase 2 conducts experiment for create learning activities using the model AIC of vocational teachers. There was evaluation of vocational teachers' AI competence in creating educational activities with AI. The presentation was divided among the 29 participants into the data analysis findings. Vocational teachers who utilize AI to create learning activities with questions have extremely good outcomes. When considering the overall average result, the assessment had a score threshold of 21.72 points, and a total of 24 points. Evaluation of vocational teachers' satisfaction with AI using for the design learning activities was at the highest level, indicating that the training material is appropriate for the circumstances at hand and that the information acquired may be put to good use in instructional activities. The assessment of vocational teachers' competency in using AI to create learning activities using questions revealed that they were performing at a very high level, which is consistent with the premise that vocational teachers are capable of learning using questions.

## ACKNOWLEDGEMENTS

We would like to thank you to Nakornluang Polytechnic College for support the sample in the research and Department of Education Technology and Information Science, Faculty of Technical Education, King Mongkut's University of Technology North Bangkok supported this research.

## FUNDING INFORMATION

Authors state no funding involved.

## AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

## CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

## DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author [KH]. The data contain information that could compromise the privacy of research participants and are not publicly available due to certain restrictions

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