

# Research on the Influence Mechanism of the Willingness to Apply Generative Artificial Intelligence in the Teaching of Higher Education Teachers

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**Abstract:** This study aims to fill a gap in the literature by analyzing the influence mechanism of the willingness to apply generative artificial intelligence in teaching of higher education teachers. The study revealed that the factors influencing college teachers' intention to reply generative artificial intelligence technology are divided into two parts: teachers' individual factors and teachers' external factors. At the level of individual teachers' factors, teachers' technology cognition is the fundamental influencing factor, and teachers' emotional fulfillment, ability and experience are the direct factors determining the application of generative AI in college teachers' teaching. At the level of external factors, the usability of generative AI is the fundamental influencing factor. This study provides a theoretical framework for promoting teacher technology application, summarizes the mechanism of different influencing factors and proposes relevant suggestions for teacher cognition level and the usability of generative artificial intelligence.

**Keywords:** Higher education teachers; Teaching; Generative artificial intelligence; Application willingness; Influencing factors; ISM modeling

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## 1. Introduction

In recent years, generative AI products such as Chatgpt, Ernie Bot, and Spark Desk have come out of nowhere and quickly attracted widespread public attention<sup>[1]</sup>. The emergence of generative artificial intelligence has subverted the traditional teaching mode of colleges and universities<sup>[2]</sup>.

this study uses the method called "ISM" to examine the factors influencing college teachers' willingness to apply generative AI in teaching, constructed an ISM explanatory structure model, and analyzed the joint effects of these factors, which is highly important for promoting relevant departments' in-depth understanding of college teachers' motivation to apply AI technology.

## 2. Literature review

This study revealed that the influencing factors of the generative AI teaching application behavior of college teachers are mainly focused on the levels of individual teachers and external conditions.

At the individual teacher level, emotional fulfillment, ability, experience, and cognition affect teachers' willingness to apply generative AI in teaching. Yiyang Wang and Weining Zhang showed that positive emotions can make individuals optimistic about the development of generative AI, which affects their use of generative AI<sup>[3]</sup>. Empirical studies have shown that only a small number of college teachers can cope with the difficulties of generative AI and teaching and have some knowledge of the functions, development prospects, and operation methods of generative AI<sup>[4]</sup>. Prior experience is one of the motivations for college teachers to use generative AI, and a lack of practical experience has a strong influence on teachers' behavioral tendencies<sup>[5]</sup>.

External conditions other than individual teacher factors also influence the use of generative AI in teaching by college teachers. Perceived usability and social support have an impact on the willingness to use Chatgpt, whether Chatgpt can benefit the user and accomplish the corresponding goals is a key factor influencing teachers' use, and social support helps users make positive decisions. Factors such as financial and environmental support provided by universities for the development of technology and national legislative support are also more worrying for university teachers when applying technology. Some college teachers believe that after trying to apply the technology, due to the lack of accuracy of the data provided, which in turn affects the teaching effect, generative artificial intelligence is no longer allowed to participate in teaching, and teachers have also proposed that the lack of communication and cooperation capabilities is the reason why teachers are reluctant to use artificial intelligence technology in teaching.

This study tries to answer the following questions: What are the fundamental factors affecting college teachers' willingness to use gen-

erative AI in teaching? What are the connections between different factors? This study uses the ISM method to determine and analyze the relationships among the influencing factors of generative AI application in college teachers' teaching and to elucidate the mechanism of action of different influencing factors.

### 3. Construction of the Explanatory Structural Model

#### 3.1 Research methodology

Interpretative structural modeling (ISM) mainly decomposes complex systems into multilevel and organized structural forms by identifying the interaction relationships between system elements to understand the internal structure of the system more deeply.

#### 3.2 Determination of influencing factors

Thirteen factors influencing the willingness of university teachers to apply generative AI were extracted from the original text.

**Table 1. Factors influencing the willingness to apply generative AI in the teaching of college teachers**

Code	Factor
F1	Emotional satisfaction
F2	Teacher capability
F3	Teacher experience
F4	Technical cognition
F5	Technical availability
F6	Functional suitability
F7	Operational accuracy
F8	Ethical issues
F9	Potential risks
F10	Communication and collaboration technology
F11	University support
F12	Social support
F13	National support

#### 3.3 Constructing the adjacency matrix

The logical relationship between the factors was determined by expert consultation and an adjacency matrix was constructed based on the results.

#### 3.4 Deduction of Reachable Matrix

According to the calculation rules of the elements in the reachable matrix, the multiplication matrix is obtained by adding adjacency matrix  $A$  and identity matrix  $I$ . The multiplication of the multiplication matrix until the matrix does not change is the reachable matrix  $M$  ( $K$  represents the path length of the two elements).

#### 3.5 Division of Influence Factor Levels

After obtaining the reachable matrices of the influence factors, the levels of each influence factor are divided. At the individual teacher level, there are four influence factors: F1, F2, F3, and F4; at the external condition level, there are nine influence factors: F5, F6, F7, F8, F9, F10, F11, F12, and F13.

#### 3.6 Drawing a Multilevel Hierarchical Structure Model (Figure 1)

## 4. Results and discussion

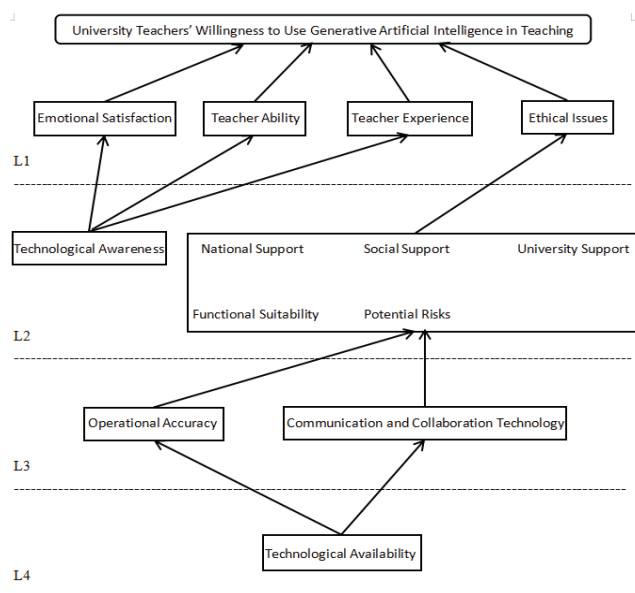
### 4.1 The Influence of Individual Teachers

At the level of individual teachers' influencing factors, the superficial factors affecting teachers' willingness to apply generative AI in teaching include three parts: affective fulfillment, competence, and experience; the fundamental factor is technology cognition.

#### 4.1.1 Factors at the representational level

Emotional fulfillment directly affects teachers' acceptance and willingness to use AI technology. Teachers' negative emotions toward the application of AI technology will cause a decline in their willingness to apply generative AI. Teachers with an optimistic attitude toward technology hold an adventurous spirit and are willing to accept the unknown challenges posed by generative AI, and this exploratory mindset is internalized into the motivation for technology application.

Teachers' ability to use and integrate AI technology directly affects their acceptance and willingness to use AI technology. Teacher ex-



**Figure 1. Influence Factor Structural Model**

perience directly affects teachers' acceptance and willingness to use AI technology. Rich experience can help teachers operate the technology skillfully and promote the practice of applying generative AI in teachers' teaching.

#### 4.1.2 Underlying factors

Technology cognition indirectly affects teachers' willingness to use technology in teaching through affective fulfillment. Neglecting to improve the technological cognitive level of educators will exacerbate the anxiety of teachers who are gradually marginalized through the process of marginalization of the teaching field.

Technological awareness indirectly influences teachers' willingness to apply technology by utilizing the integrated capabilities of artificial intelligence. Teachers' perceptions of the usefulness and ease of artificial intelligence technology and their proficiency in technical operations are usually reflected in intuitive and significant university teaching evaluation results. Technological awareness indirectly influences teachers' willingness to apply technology through experience. A certain level of awareness will continuously enrich and update existing experiences in the process of teachers' technical learning.

#### 4.2 External influencing factors

At the level of external influencing factors, the epiphenomenal layer factor affecting teachers' willingness to apply generative AI in teaching is ethical; the second intermediate layer factor is state support, social support, and university support; the third intermediate layer factor is operational accuracy and communication and cooperation technology; and the fundamental factor is the usability of generative AI.

##### 4.2.1 Epiphenomenal layer factors

Ethical issues directly affect the willingness of college teachers to apply generative AI in teaching. As many scholars have emphasized, ethical risks not only in relation to the diffusion of technology and its applicability in teachers' teaching but in relation to the future of the field of higher education.

##### 4.2.2 Second Intermediate Tier Factors

State, society, and university support indirectly affect the willingness of university teachers to apply generative AI in teaching through ethical issues. Ethical issues can be resolved through technical support. At the national level, legislation and the establishment of funds can promote the rational development of generative AI by technologists; at the social level, cooperation among social organizations, colleges and universities promotes the continuous upgrading of technological products and provides technical resources and infrastructure for universities. At the university level, providing training and learning opportunities for teachers is conducive to the development of technical operation norms for teachers and the reduction of ethical problems.

Functional applicability indirectly affects the willingness of college teachers to apply generative AI in teaching. Generative AI requires teachers' control, and perfecting the teacher identification function of the technology will avoid generating harmful instructions or biased content.

Potential risks indirectly affect the willingness of college faculty members to use generative AI in their teaching through ethical issues. The use of technology may also create the risk of data and information leakage.

### 4.2.3 Third Intermediate Tier Factors

Operational accuracy indirectly affects the willingness to apply generative artificial intelligence in the teaching of university teachers through the second intermediate layer factor and the epiphenomenal layer factor and has a positive predictive effect on functional applicability and support from the university, society, and the state and a negative predictive effect on potential risks.

Communication and cooperation technology indirectly affects the willingness of college teachers to apply generative AI in teaching through the second intermediate layer factor and the epiphenomenal layer factor, which has a positive predictive effect on functional applicability and support from colleges and universities, society, and the state and a negative predictive effect on potential risk.

### 4.2.4 Fundamental Factors

The usability of generative AI indirectly affects the willingness to apply generative AI in college teachers' teaching through intermediate-level factors and has a positive predictive effect on operational accuracy, communication and production techniques. The lack of usability of artificial intelligence technology may be due to large deviations in the results of technology operation or lack of conditions for technology testing, which obviously does not guarantee the accuracy of technology operation and communication and cooperation.

## 5. Conclusions

This study revealed that the fundamental factors influencing the willingness of university teachers to apply generative artificial intelligence in teaching are technological awareness and the availability of generative artificial intelligence. The purpose of this study is to analyze the attitudes, application intentions and influencing factors of different teachers toward generative AI functions, based on the current situation of insufficient application of generative AI by teachers, and to encourage AI technology to promote the deepening reform of teaching. Based on the research findings, university teachers' awareness of generative artificial intelligence should be increased, it is also important to help teachers develop a sense of collaboration between humans and machines and create a harmonious atmosphere for technology use. In contrast, generative artificial intelligence technology should be enhanced and updated.

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