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Article

Analysis of Automated Content Generation and Adaptive Teaching Pathways of AIGC in Informational Teaching of Preschool Education Majors

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Abstract: Generative artificial intelligence, as the latest breakthrough in artificial intelligence, has attracted widespread attention in the field of education since its release. With the background of intelligent transformation of education, this study compiles and analyzes AIGC technology and its application in teaching preschool education majors, establishes a model of influencing factors on the effectiveness of AIGC application, and explores the adaptive teaching path of AIGC application in informatization teaching of preschool education majors. The core factor scores of the sample preschool education majors are all greater than 3.65, and the effectiveness of AIGC application is in the middle to upper level. Meanwhile, the positive contribution of teacher traits, teacher support, equipment use, learning motivation, learning attitude, self-efficacy, technical support, and learning atmosphere to the effectiveness of AIGC application was verified at the 5% level. The study proposes that AIGC technology be utilized to develop teachers' nurturing and students' creativity, to enhance the relevance of teaching evaluation and the utilization of resource recommendations, and to promote the high quality of teaching and learning in preschool education.

Keywords: AIGC; structural equation modeling; preschool education; teaching pathway

1. Introduction

Informatization teaching refers to the integration of education and modern information technology, prompting education and teaching to meet the development requirements of the new era of modernization [1]. In preschool education professional learning and teaching, the course form of informatization literacy is not high. The integration of information technology into preschool education professional learning helps to promote the process of preschool education informatization [2]. With the advancement of the development process of information technology, preschool education purposefully cultivates young children's cognition, emotion, will, etc., and preschool education majors need to combine the curriculum and information technology with each other more to promote the development and leadership [3-4].

Generative Artificial Intelligence (AIGC) refers to the use of artificial intelligence technology to automatically generate various forms of digital content, such as text, images, video, audio, etc [5]. The generation of such content relies on AI techniques such as machine learning, deep learning, and natural language processing, and can be realized through methods such as pre-trained grand models, generative adversarial networks, etc.[6]. AIGC represents the latest advances in AI techniques for creative content generation, and its rapid development marks a new direction in AI techniques away from the traditional analysis of data and toward the generation and creation of new content[7]. Currently, AIGC technology is penetrating into all fields of society with unprecedented speed and breadth, especially in designing adaptive teaching paths to trigger subversive impact and reconstruction [8]. The planning of adaptive learning paths goes beyond simple curriculum adjustments by profiling students' learning data and



behavioral patterns [9]. This kind of personalized planning not only helps students to improve their learning effectiveness in the short term, but also cultivates their ability to learn independently as well as their motivation to make continuous progress in the long term [10]. AIGC is not only a highly efficient content production tool, but also a brand new design and creativity tool, which has an important research value in reshaping our thinking mode and workflow.

Scholars at home and abroad have highly recognized the role that AIGC can play in the field of education. Literature [11] focuses on the process of generating adaptive learning content by AIGC technology, obtaining user profiles by analyzing educational resource libraries and students' behavioral data, and generating personalized learning materials by using methods such as deep learning frameworks and reinforcement learning, which has a significant advantage in optimizing the allocation of resources and improving learning outcomes. Literature [12] explores the application of AI technology in language learning, especially in cross-cultural communication, such as providing personalized feedback and interacting with language learners, and provides a case study of an AI-enhanced language communication platform, which can effectively improve learners' cross-cultural communication skills. Literature [13] provides an in-depth analysis of the automatic generation of personalized content based on AIGC technology, and builds a Transformer model for the automatic generation of personalized learning content, and learns that the technology used has a significant effect on improving the learning efficiency of the students through actual cases, and can provide students with diversified learning content. Literature [14] combines the AIGC competency framework with Bloom's Taxonomy of Educational Objectives to design means for educators to use AI tools equitably to help students learn equitably. Literature [15] integrates generative AI models, adaptive learning algorithms, and real-time feedback mechanisms to form a personalized mathematics learning system, which develops specific learning plans for students to improve their learning engagement and deepen their understanding and mastery of mathematical theorems. Literature [16] built an intelligent curriculum design model based on AIGC technology, which can formalize the teaching process into cognitive adaptive teaching strategies, and then the probability-based learning state estimation module updates the knowledge representation according to real-time performance indicators to achieve personalized adaptation, which effectively improves the flexibility of the classroom. Literature [17] implemented a classroom teaching model based on the integration of AIGC enhancement and human-computer collaboration mechanism in the three phases of programming classroom, and students' academic performance, motivation, and satisfaction were improved in the proposed teaching model compared with the traditional teaching model.

In summary, the application of AIGC technology in education is concentrated in the higher education stage, and its positive role in guaranteeing educational equity, promoting personalized learning, and fostering digital awareness has been clarified, and its research in the informatization teaching of preschool education majors has yet to be further developed [18-19]. However, the application of AIGC technology in education also has some shortcomings. For example, literature [20] points out that the teaching classroom empowered by AIGC technology provides students with personalized learning paths and promotes the steady improvement of teaching quality, but it also leads to problems such as the formation of excessive dependence of students or the weakening of the relationship between teachers and students.

Under the development of intelligent technology, AIGC technology to assist preschool education students to improve their professional ability has become the demand of their talent training. On the basis of analyzing the scene of AIGC automated content generation in information technology teaching, this paper takes the preschool education majors who adopt AIGC technology teaching in a school as the research object, selects the influencing factors of the effectiveness of the application of AIGC from the three levels of the teacher factor, the student factor and the environmental factor, constructs the research model, and puts forward the research hypotheses. Data were collected through questionnaires, and descriptive statistical analysis, correlation analysis and structural equation modeling were utilized to grasp the core literacy development of the sample students and test the research hypotheses. Finally, the AIGC adaptive teaching path in preschool education teaching is given in order to provide theoretical support for AIGC technology-enabled preschool education teaching.

2. Automated Content Generation in Informative Teaching and Learning

In the context of curriculum reform and the in-depth development of students' core literacy, the teaching skills of preschool education majors should be improved accordingly, and advanced artificial intelligence technology should be fully and reasonably utilized. Artificial Intelligence Generated Content (AIGC) is an emerging artificial intelligence technology, which can simulate the human generative thinking process through machine learning, automation and simulation, etc. The development and application of AIGC technology provides a powerful support for the informatization teaching of preschool education majors.

In the informatization teaching of preschool education majors, AIGC technology can be introduced in several ways. One way is to provide a personalized learning environment through the use of artificial intelligence technology and virtual simulation platform, so that students can practice and explore problems in virtual scenarios. Another way is to introduce intelligent aids in teaching, such as intelligent learning guidance systems and real-time feedback systems. Therefore, the application of AIGC technology for automated content generation in education can be analyzed from the dimensions of teacher teaching and student learning, including 9 major content generation technology scenarios.

2.1. Teacher teaching level

At the level of teacher teaching in preschool education, automated content generation mainly includes the following scenarios:

(1) Text generation: including non-interactive writing, interactive dialog, etc. It can generate course plans, lesson plans for preschool education majors, assisted Q&A, and homework review.

(2) Audio generation: including voice broadcasting, voice cloning, intelligent dubbing, and music generation. It can be used for digital teacher's voice explanation, lecturer's voice cloning, and teaching scene sound recognition and generation.

(3) Image generation: using text with pictures to create teaching situations, board book board drawing design, drawing creativity, 3D modeling teaching, and so on.

(4) Video Generation: Teaching video quality repair, adding or subtracting specific teaching elements, automatically generating short video summaries, automatically adjusting the teaching video content dynamically, and so on.

(5) Strategy generation: generating teaching organization strategies, selecting teaching methods, optimizing the flow of teaching activities for preschool education majors, and providing personalized teaching plans.

(6) Multi/cross-modal generation: Generation of multi-modal information such as expressions, movements, voices, texts, etc. of intelligent teachers, conversion of text-picture-audio-visual cross-modal teaching information, accurate assessment based on multi-modal information, etc.

(7) Digital Human Generation: Generate virtual humans with human characteristics such as perception, reasoning, decision-making, expression, etc. Digital teachers with professional subject knowledge and teaching ability in preschool education can be set up to follow the laws of teaching and play the roles of explaining, tutoring, question-answering, and assessment.

(8) Meta-universe Generation: Based on the teacher portrait and AIGC, it generates a virtual teaching world with intelligent teaching functions and can interact with the real world, including generating teacher avatars and various virtual teaching activities.

(9) Robot behavior generation supported by multimodal large model: Multimodal large model is combined with robot with language understanding, audio-visual perception, logical reasoning, behavior control and other functions, which can carry out robot hosting/assisted teaching, human-robot collaborative teaching and so on.

2.2. Student Learning Dimensions

At the level of student learning in preschool education, automated content generation mainly includes the following scenarios:

(1) Text generation: search and organization of learning materials, study plan formulation, collaborative learning conversations, etc.

(2) Audio generation: including automatic comparison and correction of practice sounds in language and music classes, cross-language communication, and digital stand-in conversations.

(3) Image generation: assisting in the generation of favorable picture exercises, creative training in painting, 3D model adjustment and printing, etc.

(4) Video generation: video content summary extraction, video exercise optimization, video face painting, video specific elements replacement, personalized teaching video generation, etc.

(5) Strategy generation: automatically configure learning resources and recommend learning content and methods according to learning objectives, conditions and learner characteristics.

(6) Multi/cross-modal generation: According to the learning needs of preschool education majors, convert and synthesize the learning information of different modalities, change the cognitive mode and carry out personalized learning, improve learning performance, and so on.

(7) Digital Human Generation: Setting up digital students with the functions of in-depth learning, social interaction, etc., which can act as virtual learning doppelgangers, learning partners and learning assistants.

(8) Meta-universe Generation: Based on student portraits and AIGC, generate a virtual teaching

world with intelligent teaching functions and interaction with the real world, including generating student avatars and various virtual teaching activities.

(9) Robot Behavior Generation Supported by Multimodal Large Models: Intelligent robots can act as learning assistants/partners/doubles to carry out human-robot collaborative learning, in which the intelligent power system of robots can also take on the functions of caring and security in addition to learning.

3. Influence factor model of AIGC application process

3.1. Model Construction and Research Assumptions

3.1.1. Modeling

In order to explore the adaptive teaching path of AIGC in the informatization teaching of preschool education majors, this study focuses on the influencing factors of the effectiveness of AIGC application in the informatization teaching of preschool education majors, and selects the three levels of teachers, students, and the environment as the dimensions of the study, and ultimately determines that the teacher's support, teacher's traits, equipment use, motivation for learning, learning attitudes, peer pressure, self-efficacy, environment layout, technology support and learning atmosphere of 10 influencing factors (denoted as A1~A10, respectively).The model of influencing factors of AIGC application process is shown in Fig. 1.Focusing on the three core dimensions of teachers, students, and smart classroom environments, the theoretical model of influencing factors of AIGC application effectiveness in this study is constructed as follows, respectively:

(1) Independent variables: teacher traits, teacher support, equipment use, learning attitudes, learning motivation, peer pressure, self-efficacy, environmental layout, technical support, and learning atmosphere.

(2) Dependent variable: the effectiveness of AIGC application, this paper adopts the development of core literacy of preschool education students as a measure of the effectiveness of AIGC application.

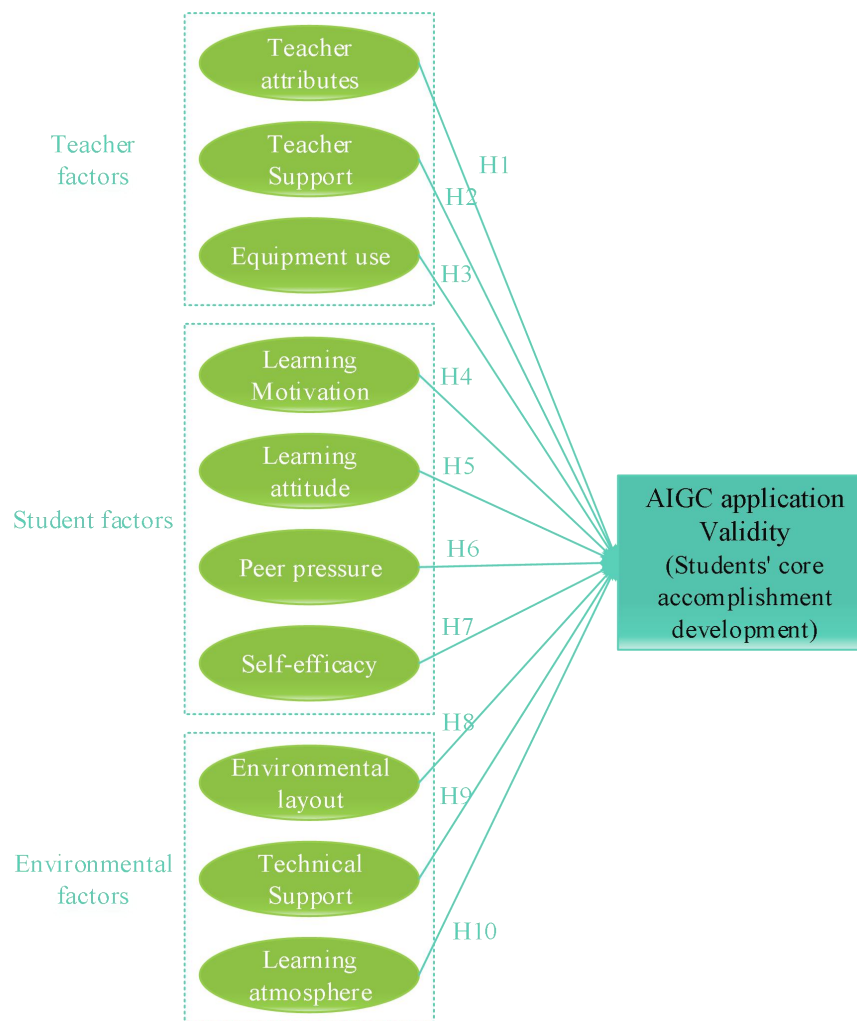


Figure 1. Influence factor model of AIGC application process.

3.1.2. Research hypotheses

Based on the above interpretation of the research variables such as teacher factors, student factors, and environmental factors, the role of each potential variable in influencing the effectiveness of AIGC application is summarized and the research hypotheses of this study are proposed:

- H1: Teacher traits have a direct positive and significant effect on the effectiveness of AIGC application.
- H2: Teacher support has a direct positive significant effect on AIGC application effectiveness.
- H3: Equipment use has a direct positive significant effect on AIGC application effectiveness.
- H4: Learning attitude has a direct positive significant effect on AIGC application effectiveness.
- H5: Learning motivation has a direct positive significant effect on AIGC application effectiveness.
- H6: Peer pressure has a direct positive significant effect on AIGC application effectiveness.
- H7: Self-efficacy has a direct positive significant effect on AIGC application effectiveness.
- H8: Environmental layout has a direct positive significant effect on AIGC application effectiveness.
- H9: Technical support has a direct positive significant effect on AIGC application effectiveness.
- H10: Learning atmosphere has a direct positive significant effect on AIGC application effectiveness.

3.2. Preparation and distribution of questionnaires

The questionnaire of this paper is divided into three main parts: the basic information part, the questionnaire part of the current status of the effectiveness of AIGC application, and the questionnaire of influencing factors. The Cronbach α coefficient value of the scale in this paper is 0.924, the KMO value is 0.758, which is between 0.7 and 0.8, and the significance of Bartlett's spherical test parameter has a P-value of <0.05, which passes the reliability and validity test.

3.2.1. AIGC Application Effectiveness Questionnaire Design

In the questionnaire section of AIGC application effectiveness status, this paper constructs the core literacy framework of preschool education students into three dimensions of cultural foundation, independent development and social participation, and six dimensions of humanistic heritage X1, scientific spirit X2, learning to learn X3, healthy life X4, responsibility X5 and practical innovation X6. Among them, humanistic heritage is divided into humanistic accumulation, humanistic sentiment and aesthetic interest, scientific spirit is divided into rational thinking, critical questioning and courageous inquiry, learning to learn includes enjoying learning, reflecting diligently and information awareness, healthy life includes valuing life, sound personality and self-management, responsibility is divided into social responsibility, national identity and international understanding, and practice and innovation includes labor consciousness, problem solving and technology application. Elements. Based on the characteristics of the core literacy of the selected preschool education students, the questionnaire part of the AIGC application effectiveness status was designed.

3.2.2. Questionnaire design for influencing factors

The questionnaire development for this section was developed in three dimensions: teacher, student and environment, and contained questions related to 10 influencing factors. Each item was scored on a five-point Likert scale.

3.2.3. Questionnaire distribution

In this paper, preschool education majors who adopted AIGC information-based teaching in a school were selected as the research object, and 300 questionnaires were recovered in this time. After screening out 46 invalid questionnaires, a total of 254 valid questionnaires were finally obtained, and the validity rate of the questionnaire was 84.67%.

3.3. Research methodology

The study was analyzed using descriptive statistical methods, correlation analysis, and structural equation modeling.

Structural equation modeling, based on the covariance matrix of variables to analyze the relationship between variables, is one of the important tools for multivariate data analysis, which can effectively deal with the relationship between latent variables (concepts such as psychological, educational, social, etc.) and measured variables, and provide theoretical support for the study of the psychological characteristics

of travel behavior. Based on the computational principles of structural equation modeling, some theoretical frameworks have been widely used. In this paper, the influencing factors of the effectiveness of AIGC application are investigated, so structural equation modeling is used.

SEM can be divided into measurement model and structural model. In order to be able to intuitively describe the causal relationship between variables, this paper uses mathematical principles to explain the structural equation model, and the model calculation is divided into two parts, the measurement model and the structural model, according to the relationship between the variables of the structural equation model. The measurement model analyzes the relationship between the manifest variables (X, Y) and the latent variables (ξ, η), and the structural model analyzes the relationship between the latent variables (ξ, η).

Measurement modeling:

$$X_{(j \times i)} = A_x_{(j \times i)(i \times I)} \xi_{(i \times I)} + \delta_{(j \times I)} \quad (1)$$

$$Y_{(m \times n)} = \Lambda_Y_{(m \times n)(n \times I)} \eta_{(n \times I)} + \varepsilon_{(m \times I)} \quad (2)$$

In Eqs. (1) and (2): X is the exogenous explicit variable consisting of j measured variables of i exogenous latent variables. ξ is a vector of i exogenous latent variables. Λ denotes the factor loading matrix of X on the ξ relationship. δ is the endogenous latent variable consisting of the j measurement errors of X . Y is the endogenous explicit variable, consisting of n exogenous latent variables of m measurement variables. η is a vector of n exogenous latent variables. Λ_Y denotes the factor loading matrix of Y on the η relationship. ε is a vector of m measurement errors of Y .

In the measurement model, X is an exogenous explicit variable, Y is an endogenous explicit variable, ξ denotes an exogenous latent variable, and η denotes an endogenous latent variable. Explicit variables can be derived directly from observations and measures, while latent variables cannot be directly observed, and latent variables contain abstract concepts as well as variables that cannot be measured accurately for E reasons.

Structural Modeling:

$$\eta_{(n \times I)} = B_{(n \times I)(n \times I)} \eta_{(n \times I)} + \Gamma_{(n \times I)(n \times I)} \xi_{(n \times I)} + \delta_{(n \times I)} \quad (3)$$

In equation (3), B is the structural coefficient matrix of the endogenous latent variables, whose diagonal elements are zero and $I - B$ is required to be non-degenerate (i.e., the value of the matrix determinant is not zero). The B coefficient matrix reflects the factor loading matrix between the endogenous latent variables of the model, Γ is the coefficient matrix of the exogenous latent variable ξ , Γ is the coefficient matrix of ξ on the endogenous latent variable η , and δ is the error vector of the model.

4. Validation and analysis of influencing factor models

4.1. AIGC Application Effectiveness Results

4.1.1. Overall development status

Based on the pre-division of core literacy of preschool education majors, the current status of the six core literacies of students in the questionnaire, namely, humanistic heritage, scientific spirit, learning to learn, healthy life, responsibility and innovative practice, was analyzed. The core literacy development scores of preschool education majors are shown in Figure 2, and the descriptive statistical analysis of the status of the six core literacies is shown in Table 1. The six core literacies of preschool education majors are in the middle to upper level, and the scores of the six core literacies of humanistic heritage, scientific spirit, learning to learn, healthy life, responsibility and innovative practice are 3.85, 3.91, 3.65, 3.71, 3.93, 3.75, respectively, of which the core literacy of responsibility is the best and the core literacy of learning to learn is the worst.

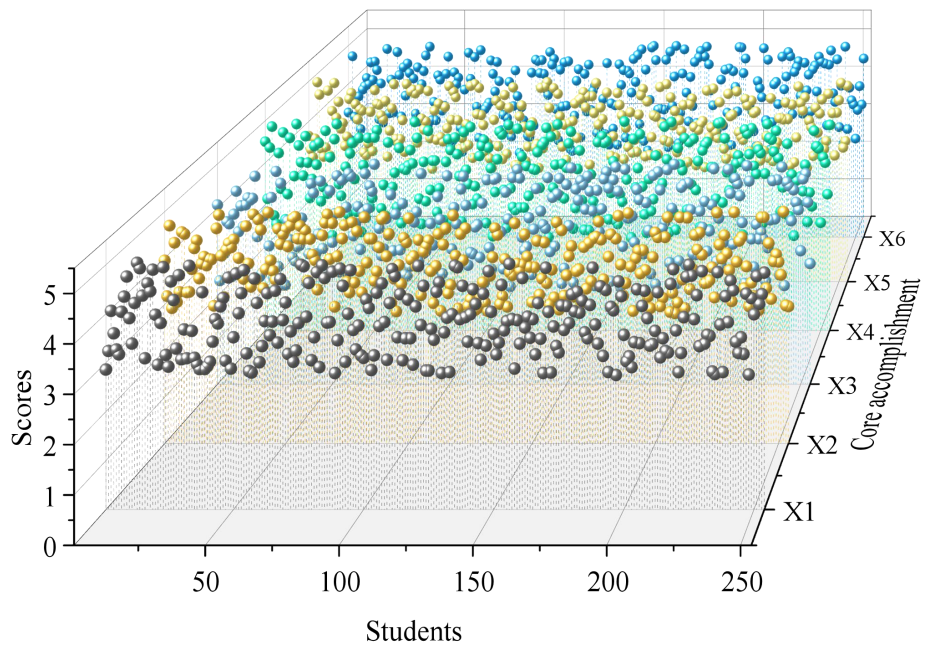


Figure 2. The core accomplishment scores of pre-school education majors.

Table 1. Descriptive statistical analysis of the present situation of the six core qualities.

	N	Min	Max	Mean	SD
X1	254	2.75	5.00	3.85	0.671
X2	254	2.81	5.00	3.91	0.628
X3	254	2.21	5.00	3.65	0.802
X4	254	2.22	5.00	3.71	0.779
X5	254	2.82	5.00	3.93	0.610
X6	254	2.20	5.00	3.75	0.773

4.1.2. Correlation analysis

The correlation analysis of the six core literacies is shown in Figure 3. There is a correlation between the six core literacies of humanistic heritage, scientific spirit core literacy, core literacy of learning to learn, core literacy of healthy life, core literacy of responsibility and core literacy of practice and innovation ($p < 0.01$), and all of them are positively correlated, with correlation coefficients of each core element greater than 0.55.



Figure 3. Six core literacy correlation analysis.

4.1.3. Analysis of student perceptions

The core literacies that students think are more difficult to possess are shown in Figure 4. The six core literacies of humanistic heritage, scientific spirit, learning to learn, healthy life, responsibility and practice and innovation accounted for 47.64%, 40.94%, 20.08%, 21.65%, 24.02% and 25.20% respectively. Generally speaking, humanistic background and scientific spirit are two core literacies that preschool education majors think are difficult to possess, while learning to learn and healthy life are relatively easy to possess.

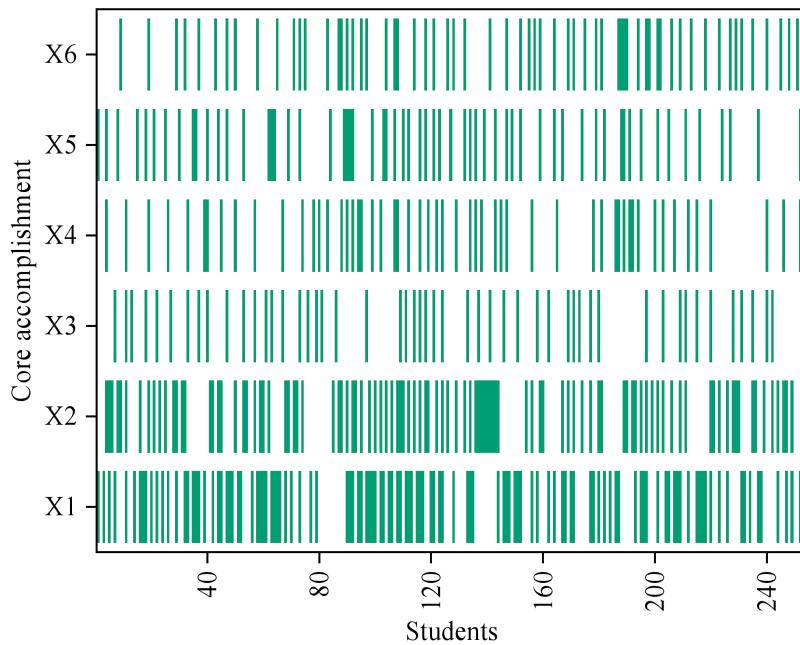


Figure 4. The difficult core qualities that students think.

4.2. Correlation analysis of influencing factors

4.2.1. Correlation of influencing factors

In this subsection, the Pearson correlation coefficient is used to analyze whether there is a correlation between the research variables and the magnitude of the correlation, and the results of the correlation analysis between the factors of the dimensions of the influencing factors are shown in Figure 5. The correlation coefficients of the 10 influencing factors in the dimensions of teacher factors, student factors, and environmental factors are all greater than 0 with a significance of $P < 0.05$, indicating that there is a significant positive correlation between the influencing factors.

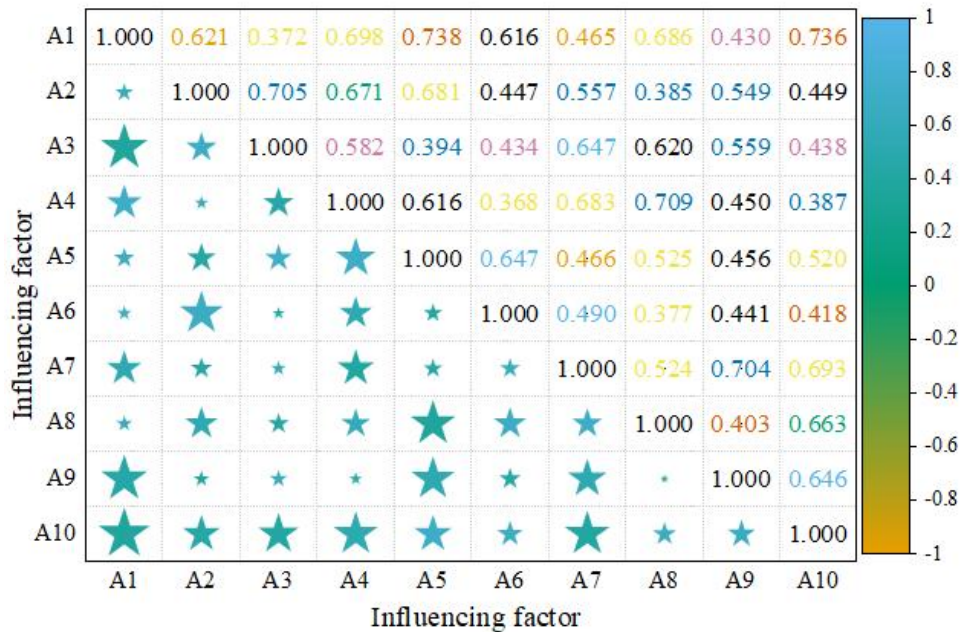


Figure 5. The relevant analysis results of each dimension factor.

4.2.2. Correlation of influencing factors with dependent variables

Using the correlation coefficient to make a preliminary covariance judgment on the influencing factors of the effectiveness of AIGC application, the six variables of the core literacy of preschool education students: humanistic heritage, scientific spirit, learning to learn, healthy life, responsibility, innovative practice and teacher factors, student factors, and the environmental factors of the 10 predictor variables, using bivariate correlation analysis, the results of the analysis of the specific data are shown below.

(1) Correlation analysis between teacher factors and students' core literacy

The results of the correlation analysis between teacher factors and students' core literacy are shown in Table 2, with * denoting $p < 0.05$ and ** denoting $p < 0.01$. All six variables of preschool students' core literacy showed significant correlations ($p < 0.01$) with teacher traits, teacher support, and equipment use, and the values of Pearson's Pearson correlation coefficients were all greater than 0, with correlation coefficients ranging from 0.329 to 0.572.

Table 2. The relevant analysis results between teacher factors and student core accomplishment.

		A1	A2	A3
X1	Pearson correlation	0.416**	0.484**	0.423**
	Sig. (double tail)	0.000	0.000	0.000
X2	Pearson correlation	0.506**	0.496**	0.464**
	Sig. (double tail)	0.000	0.000	0.000
X3	Pearson correlation	0.437**	0.397**	0.452**
	Sig. (double tail)	0.000	0.000	0.000
X4	Pearson correlation	0.572**	0.447**	0.449**
	Sig. (double tail)	0.000	0.000	0.000

X5	Pearson correlation	0.523**	0.448**	0.548**
	Sig. (double tail)	0.000	0.000	0.000
X6	Pearson correlation	0.421**	0.329**	0.562**
	Sig. (double tail)	0.000	0.000	0.000

(2) Correlation analysis between student factors and students' core literacy

The results of the correlation analysis between student factors and students' core literacy are shown in Table 3. The humanistic heritage X1 is significantly correlated with the four variables in the student factors, and the values of Pearson's Pearson correlation coefficient are 0.486, 0.375, 0.715, and 0.605, which are all greater than 0, with a significance of $p < 0.01$. Similarly, the scientific spirit X2, learning to learn X3, healthy life X4, responsibility X5, and practice and innovation X6 with the four variables in the student factors are also all significantly positively correlated.

Table 3 The relevant analysis results between student factors and student core accomplishment

		A4	A5	A6	A7
X1	Pearson correlation	0.486**	0.375**	0.715**	0.605**
	Sig. (double tail)	0.000	0.000	0.000	0.000
X2	Pearson correlation	0.549**	0.303**	0.424**	0.412**
	Sig. (double tail)	0.000	0.000	0.000	0.000
X3	Pearson correlation	0.380**	0.310**	0.407**	0.407**
	Sig. (double tail)	0.000	0.000	0.000	0.000
X4	Pearson correlation	0.618**	0.404**	0.495**	0.343**
	Sig. (double tail)	0.000	0.000	0.000	0.000
X5	Pearson correlation	0.660**	0.514**	0.359**	0.635**
	Sig. (double tail)	0.000	0.000	0.000	0.000
X6	Pearson correlation	0.438**	0.642**	0.485**	0.599**
	Sig. (double tail)	0.000	0.000	0.000	0.000

(3) Correlation analysis between environmental factors and students' core literacy

The results of correlation analysis between environmental factors and students' core literacy are shown in Table 4. There is a significant correlation between students' core literacy and the environmental dimensions of environmental layout, technical support, and learning atmosphere, with significance values less than 0.01, and the correlation coefficients between the variables are all greater than zero.

In summary, the teacher dimension, the student dimension, the environment dimension including each variable and the effectiveness of AIGC application showed significant correlation, which does not fully indicate that there is a causal relationship between each influencing factor and the effectiveness of AIGC application. The correlation analysis only reflects the existence of a certain degree of correlation between the variables, so it is necessary to further study the relationship between the predictor variables and the effectiveness of AIGC application in various dimensions with the help of structural equation modeling analysis.

Table 4. The relevant analysis results between environment factors and core accomplishment.

		A8	A9	A10
X1	Pearson correlation	0.571**	0.719**	0.471**
	Sig. (double tail)	0.000	0.000	0.000
X2	Pearson correlation	0.328**	0.323**	0.693**
	Sig. (double tail)	0.000	0.000	0.000
X3	Pearson correlation	0.432**	0.427**	0.321**
	Sig. (double tail)	0.000	0.000	0.000
X4	Pearson correlation	0.631**	0.397**	0.715**
	Sig. (double tail)	0.000	0.000	0.000
X5	Pearson correlation	0.548**	0.497**	0.441**
	Sig. (double tail)	0.000	0.000	0.000
X6	Pearson correlation	0.571**	0.535**	0.650**
	Sig. (double tail)	0.000	0.000	0.000

4.3. Structural equation modeling analysis

4.3.1. Tests of model fit

Before verifying the assumptions of the structural equation model, the fit of the structural equation model needs to be assessed, and the results of the model fit index are shown in Table 5. The value of the χ^2 /df index is 2.366, which is between the optimal interval of 1-3, indicating that the model fit is ideal. The values of the GFI, AGFI, and index are 0.873, 0.886, respectively, which are close to 0.9, indicating that the model fit is high. The value of the RMSEA is 0.052, which is less than 0.08. The NFI, CFI, and TLI indexes The values of NFI, CFI, and TLI indicators are 0.918, 0.942, and 0.939, respectively, which are greater than 0.9, and all of them have reached the best fitness criteria, indicating that the overall fitness situation of the modified structural equation model is better.

Table 5. The model's quasi composite index results.

Evaluation index	Fitting coefficient value	Fittest	Standard
		Excellent	Acceptable
χ^2 /df	2.366	<3.0	3.0-5.0
GFI	0.873	>0.90	0.7-0.9
AGFI	0.886	>0.90	0.7-0.9
RMSEA	0.052	<0.08	0.08-0.1
NFI	0.918	>0.90	0.7-0.9
CFI	0.942	>0.90	0.7-0.9
TLI	0.939	>0.90	0.7-0.9

4.3.2. Path analysis of the model

From the analytical content of the previous section, it can be seen that the modified research model fit well, in order to further test the hypothesized path relationship between the potential variables, and to verify whether the research hypotheses of this paper are valid. Based on Estimate value, CR value, and significance p-value to determine the relationship of impact effect among the study variables, the absolute value of path coefficients represents the degree of impact, and positive or negative represents the positive or negative direction. P-values less than 0.001 show “***” indicating that significance at the 0.001 level was reached. The absolute value of C.R. value i.e. critical ratio is greater than 1.96 indicating that the path reaches 0.05 significance. The results of the path analysis of each research hypothesis in the model are shown in Table 6 below.

The significance p-values of the path “peer pressure→AIGC application effectiveness” and the path “environmental layout→AIGC application effectiveness” are 0.286 and 0.357, which are greater than 0.05 and have not reached the significant level, and peer pressure and environmental layout do not have a significant effect on AIGC application effectiveness. AIGC application effectiveness have no significant effect, and hypotheses H6 and H8 are not valid. And the significance p-value of the rest of the paths <0.05, all of them reached the level of significance, and the hypotheses passed the test. Among them, self-efficacy has the greatest positive effect on AIGC application effectiveness with an estimated coefficient of 0.229.

Table 6. The results of the study hypothesis of path analysis in the model.

Number	Path	Estimate	S.E.	C.R.	P	Validation
H1	A1→AIGC	0.122	0.037	3.383	***	Significant
H2	A2→AIGC	0.137	0.028	2.577	***	Significant
H3	A3→AIGC	0.101	0.031	3.686	0.033	Significant
H4	A4→AIGC	0.113	0.024	2.776	***	Significant
H5	A5→AIGC	0.134	0.024	2.289	***	Significant
H6	A6→AIGC	-0.051	0.029	1.106	0.286	No
H7	A7→AIGC	0.229	0.035	4.693	***	Significant
H8	A8→AIGC	0.042	0.026	0.978	0.357	No
H9	A9→AIGC	0.093	0.038	2.532	0.015	Significant
H10	A10→AIGC	0.129	0.022	4.073	***	Significant

5. AIGC-based Adaptive Instructional Pathways

Combined with the above analysis of the influencing factors on the effectiveness of AIGC application, we explore the adaptive teaching path of AIGC application in the informatization teaching of preschool education majors, and discuss the aspects of teachers' teaching, students' learning, teaching evaluation, and integration of educational resources.

5.1. Strengthening the nurturing nature of teachers

AIGC technical support to further strengthen the teacher nurturing in the preschool education program information technology teaching. Generative AI can refine the data qualities of the sample, compare them with the data in the model, and select the result with relatively higher probability. This problem solving path learns the logic of human thinking and generates more common sense results. This can further help preschool teachers to utilize their individual creativity, perceptual and operational abilities, and social intelligence to better personalize effective teaching. In this context, teachers need to take on multiple roles as defenders of human dignity and value, supervisors and correctors of machine teaching, diagnosticians of students' psychological problems, transmitters of teacher-student relationships, and coordinators of the "human-machine synergy" teaching mode. Teachers can make use of AIGC's strong power of presentation, high intuition, significant diversity and other characteristics to create a variety of learning situations for students, stimulate students' interest in learning, mobilize students to participate in multi-sensory, increase the form of teaching and learning, so that the teaching process is more diversified, which is conducive to the improvement of the efficiency of the teaching of pre-school education majors.

5.2. Developing student creativity

Artificial intelligence learning supported by AIGC technology is more creative. At this time, teachers and students use generative AI technology to complete human-computer co-creation, leaving the repetitive and conceptual knowledge listing and organizing work to be completed by the technology, inspiring themselves with the breadth of the generated content, and using their individual cognition and creativity to fully invest in the description, organization, judgment, screening and integration of the generated content. For example, teachers can use the teaching materials generated by AIGC technology to assist themselves in innovative teaching activity design, task design, lesson plan design, etc. Students can also use the examples or materials generated by AIGC to fully develop their creativity and other higher-order thinking. At the same time, the accuracy of AIGC-generated content should be carefully evaluated, and copyright and ethical issues should be taken into account when citing it, so as to ensure that generative AI continues to play a positive role.

5.3. Promoting the relevance of teaching evaluation

AIGC technical support to promote the relevance of teaching evaluation of preschool education majors with information technology. The application of decision-making artificial intelligence in the field of teaching evaluation includes intelligent recommendation system, etc. On this basis, generative artificial intelligence not only evaluates according to the input data under the conditions of pre-set indexes, but also generates more targeted evaluation according to the personalized performance of learners. In addition, the application of AIGC technology analyzes and summarizes the characteristics of excellent students' works, according to which examples and references can be generated for other students.

5.4. Full utilization of recommended resources

The resource recommendation of preschool education professional education with AIGC technical support is more generative. Artificial intelligence educational resources and various types of educational resources development has similar characteristics, namely, the volume of educational resources gradually increased, educational resources content is gradually rich, but the current volume of resources from the training of effective AIGC model is still there is a certain lack of high-quality resources there is a lack of AIGC technology to support the generative artificial intelligence model makes the generation of the results of the content of the industrialization of the results have been greatly enhanced, and the digital educational resources human-computer co-creation has a very high degree of compatibility. The human-computer co-creation of digital educational resources has a high degree of compatibility. In this case, teachers and students interact with AIGC in the process of content co-creation, and at the same time review and sort out the content, make full use of AIGC-generated resources to help students better preschool education professional learning.

6. Conclusion

The study aims to explore the application of AIGC technology in the teaching of preschool education majors in information technology, constructs a model of influencing factors on the effectiveness of AIGC application, explores the current situation of the effectiveness of AIGC application and the influence of each factor, and then further proposes an adaptive teaching path for AIGC application in the teaching of preschool education majors. In this paper, the effectiveness of AIGC application is measured by the development of core literacy of preschool education majors, and it is found that the development of core literacy of the sample students is at an intermediate-upper level, with the scores of the six core elements above 3.65. In the results of structural equation modeling analysis, except for the positive and significant effects of peer pressure and environmental layout on the effectiveness of AIGC application which did not hold true ($p > 0.05$), all the other eight hypotheses of the research model passed the test, and the other eight influences proved to be significantly and positively correlated with the effectiveness of AIGC application, i.e., teacher attributes, teacher support, equipment use, motivation to learn, attitude to learning, self efficacy, technical support, and learning atmosphere can all promote the application of AIGC in informatization teaching of preschool education majors, among which the self-efficacy factor has the greatest influence, with a path-estimated coefficient of 0.229.

The era of artificial intelligence has come, as preschool education majors as well as future teachers in the new era, it is necessary to pay more attention to the effective combination of advanced artificial intelligence technology and preschool education majors' teaching skills, to develop teachers' nurturing and students' creativity, to enhance the pertinence of teaching evaluation, to fully utilize the recommended resources with the support of AIGC technology, and to make the AIGC technology become the teaching and development of preschool education majors' favorable tool.

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