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APPLICATION OF AIGC-ASSISTED VISUAL INSPIRATION IN EARLY CHILDHOOD ART EDUCATION

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Abstract: Generative artificial intelligence content (AIGC) is gradually permeating early childhood art education and reshaping teaching models, but its specific impact on key processes of early childhood art creation still lacks scientific empirical support. This study used a controlled variable comparative experimental design, combined with expert scoring, to explore the impact of AIGC software intervention at different stages of the painting course on the two core processes of children's idea generation and design expression in children's paintings. The results showed that passively receiving AIGC inhibited the originality of children's idea generation in painting, but had no significant impact on the fluency of this process. However, actively referring to AIGC during the painting process could improve children's design expression ability, and improve their composition and color expression abilities in this stage. Based on this, the study suggests that AIGC can be used as an auxiliary reference tool in the painting process to help children's artistic abilities develop.
Keywords: Generative AI content; Early childhood art education; Idea generation; Design expression

1 INTRODUCTION

With the rapid development of artificial intelligence technology, its application value in the field of early childhood art education is becoming increasingly prominent. Existing research shows that artificial intelligence can provide multifaceted support for kindergarten art activities, including assisting teachers in lesson preparation, optimizing children's artwork, and expanding creative avenues [1]. In early childhood song performance education, artificial intelligence can also help to personalize teaching, enrich educational resources, and enhance classroom interactivity and fun [2]. It can be seen that the integration of artificial intelligence and early childhood art education has become an emerging teaching model, which can serve as a beneficial supplement to traditional teaching methods, assisting teachers in carrying out personalized teaching and improving the quality of teaching outcomes. However, current research focuses primarily on theoretical discussions and practical descriptions, with limited experimental investigations into the specific implementation effects and mechanisms of artificial intelligence (AI) in kindergarten art education, particularly regarding its impact on children's creative development. Therefore, it is necessary to systematically explore the application effects of AI-generated content (AIGC) in early childhood art education from a scientific and empirical perspective. This study, through field experiments combined with the teaching practice of AIGC software, focuses on analyzing the actual impact of AIGC on various dimensions of creativity in assisting children's painting, aiming to provide empirical evidence for the deep integration of artificial intelligence and early childhood art education.

While there are various opinions in academia regarding the stages of artistic creation, the general consensus is that these stages involve different stages of thinking and behavior. Teng Jing, summarizing previous research on the creative process, points out that creative thinking is divided into a continuous repetition of the "generation-exploration" stage [3]. Botella et al., through interviews with visual arts students, summarized a multi-stage model including Idea Generation, Incubation, Elaboration/Production and Finalization, emphasizing the dynamic development of creation from conception and processing to completion [4]. Yokochi and Okada, in their study comparing experienced artists and novice creators, pointed out that artistic creation often follows a spiral evolutionary path of "theme transformation—technique exploration—process adjustment—form construction," reflecting a continuous transformation from creative conception to finished product presentation [5]. In summary, most scholars agree that artistic creation can be summarized into two core processes: idea generation and design expression. The former refers to the process by which an individual, after identifying a problem, forms a creative image in their mind through divergent and convergent thinking; the latter refers to the process of externalizing the inner concept into a concrete work through visual language, composition, color, and other means.

The abilities relied upon at different creative stages have different emphases. In the "idea generation" stage, creative thinking is mainly reflected in the diversity and novelty of ideas. Runco and Acar et al., as well as Tiansheng Xia et al., pointed out that fluency (the number of ideas generated) and originality (the uniqueness of ideas) can be used as evaluation indicators for this stage [6]. In the "design expression" stage, the focus is on the ability to transform imagery into concrete forms, involving composition, color application, and media manipulation. Goldschmidt believes that this process is accompanied by a "visual-response-adjustment" cycle, with creators optimizing their work based on feedback [7]. Therefore, composition ability and color expression ability can serve as important dimensions for evaluating the design expression stage.

In summary, this study divides the quality assessment of early childhood painting into two dimensions: idea generation (including fluency and originality indicators) and design expression (including composition ability and color expression ability indicators). The composition of creativity is shown in Figure 1.
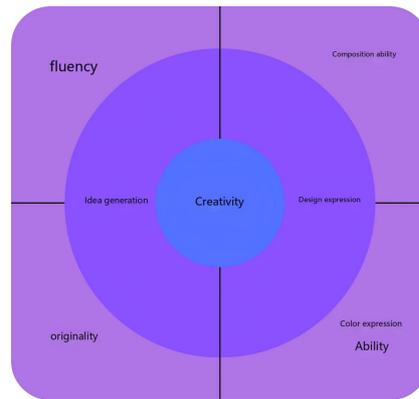

Figure 1 Creativity Composition Diagram

This study aims to explore the influence mechanism of AI-generated content (AIGC) on children's creative process and results in kindergarten art teaching through empirical methods. The study selected 24 children in the middle class of a model kindergarten in a provincial capital city in East China as experimental subjects, and introduced AIGC software for painting-assisted teaching in a natural teaching context. Through field experiments and classroom observations, the behavioral performance and work output of children in the two stages of "idea generation" and "design expression" were systematically collected, and quantitative evaluation was carried out based on four indicators: fluency, originality, composition ability, and color expression ability. This study focuses on analyzing the changes in children's creative ideas and visual expression after AIGC intervention, revealing its specific pathways and effects on various dimensions of children's creativity. This aims to supplement existing research on empirical aspects and provide practical reference for the scientific application of artificial intelligence in early childhood art education.

2 METHODS AND RESULTS

2.1 Research Subjects

This study used 24 children from a model kindergarten in a provincial capital city as research subjects, including 12 boys and 12 girls, aged 5±1 years. All guardians and kindergarten staff provided informed consent in writing and understood the experimental procedure and purpose. Furthermore, based on the students' regular homework assignments, there was no significant difference in their creative abilities, making them comparable.

2.2 Experimental Procedure

The study selected "Draw a car you imagine" as the course theme, designed with three consecutive stages: brainstorming (3 minutes), slide presentation (5 minutes), and independent creation (approximately 25 minutes). In the brainstorming stage, the teacher guided all children to conceive the content of the picture through verbal expression and group discussion; in the presentation stage, the teacher used a PowerPoint presentation to show various types of vehicles to expand children's visual experience and stimulate detailed ideas; in the independent creation stage, children used various drawing tools (such as watercolors, crayons, rulers, etc.) to complete the theme creation.
Based on different AIGC intervention methods, children were randomly divided into three groups:
Group 1 (control group): After participating in brainstorming and slide presentation, they directly entered the independent creation stage without AIGC intervention.
Group 2 (Interactive Generation Group): Building upon the completion of the first two stages as Group 1, children can proactively request creative ideas from the experimental staff during the independent creation stage (e.g., "Draw a car shaped like a cake"). The staff will then generate images using AIGC software for reference. To control the intensity of intervention, each child can refer to AIGC content a maximum of two times.
Group 3 (Passive Reference Group): In addition to completing the first two stages, children will view several pre-generated vehicle drawings from AIGC as inspirational stimuli, but cannot request additional AIGC assistance during the independent creation stage.

2.3 Scoring Procedure

This study measures creativity based on two dimensions: idea generation and design expression. The idea generation dimension is scored on "fluency" and "originality," while the design expression dimension is scored on "composition ability" and "color expression ability." The following is a detailed explanation of these four dimensions and specific scoring rules. The children and teachers were not aware of the scoring criteria.

2.3.1 Fluency evaluation

In his experiment, Tiansheng Xia defined fluency as an indicator of creative output, determined by the total number of creative ideas generated [8]. Fluency scores require counting the total number of complete ideas (excluding incomplete ideas) listed by participants. This experiment uses the same evaluation index, defining fluency as the total number of complete ideas (excluding incomplete ideas) listed by participants, without considering aesthetics, color matching, or other factors unrelated to the number of elements, i.e., the total number of elements in the drawing, including vehicles, paintwork, patterns, and environmental arrangements. Drawings with fewer elements are assigned 1-3 points, and drawings with more elements are assigned 3-5 points. Table 1 (left) shows examples of drawings for each fluency score range:

2.3.2 Originality evaluation

Originality is scored from 1 point (basically similar to the provided materials or everyday items) to 5 points (most original). Expert originality scoring is used because the sample size is too small to determine originality based on the frequency of individual ideas. Expert scoring is based on consensus between the two authors, and any disagreements are resolved through discussion until a consensus is reached. Table 1 (right) shows examples of illustrations for each segment of the originality score:

Table 1 Examples of Fluency and Originality Scores

Fluency Score	Example	Reason	Originality Score	Example	Reason
1 point		Too few elements, only vehicle outline and a few internal details.	1 point		Basically the same as the theme and color scheme of the provided "Pumpkin Sports Car" image (Shown in Figure 2).
3 points		Moderate number of elements, full overall vehicle outline, with appropriate external detail decoration.	3 points		Similar to the image of Butterfly Mary in the animation "Happy Cool Baby", but the color scheme and detail outline are different (Shown in Figure 3).
5 points		Abundant number of elements, full vehicle outline, rich external details, and in addition to the vehicle itself, there are appropriate environmental elements as embellishments.	5 points		The vehicle's exterior design is highly original, incorporating various vehicle shapes and matching them well.

Figure 2 Image of a Pumpkin Sports Car Generated by AI Provided in the Experiment

Figure 3 Animation Character "Butterfly Mary"

2.3.3 Evaluation of composition ability

This study evaluates children's composition ability based on the relevant research by Lin Lin and Luo Jinjing on children's composition ability at different developmental stages [9]. This study points out that children's drawing composition exhibits clear stages of evolution with age, specifically progressing from a chaotic style to a parallel style, then to a scattered style, and finally to an occluded style. The core connotations of each stage of composition are defined as follows:

Chaotic composition: Children do not consciously plan the space of the images in the picture, but simply distribute various objects randomly within the picture area, without obvious spatial organization logic;

Parallel composition: Children use single, basic spatial relationships to integrate picture elements. Various objects are mostly presented in parallel or vertical arrangements, with no complex spatial relationships between elements;

Scattered composition: Picture elements begin to form a primary and secondary relationship. The layout shows the characteristic of radiating outwards from the main element as the core, and the spatial organization has a preliminary logic;

Occluded composition: Children can construct spatial layers of depth and distance in the picture through the occlusion relationship between elements, reflecting a preliminary understanding of three-dimensional spatial relationships.

Based on the compositional forms presented in children's classroom paintings, the maturity of their compositional abilities can be judged. This evaluation system divides compositional ability into 5 scoring levels, with the specific correspondence as follows:1 point corresponds to a chaotic composition; 2 points correspond to a parallel composition; 3-4 points correspond to a scattered composition (where the score difference mainly depends on the prominence of the main elements in the picture); 5 points correspond to an obscuring composition. Examples of paintings for each scoring level are shown in Table 2 (left):

2.3.4 Evaluation of color expression ability

This study's assessment of children's color expression ability in the experiment is based on Pian Cen's relevant research on the development of children's painting expression ability [10]. Piancen systematically analyzed the stage-specific characteristics of children's color expression ability, specifically dividing it into different levels. The core performance characteristics of each level are defined as follows:

Weak color expression ability: Children possess basic color control awareness, but their control ability is poor; color selection lacks purpose and logic, exhibiting strong randomness; the overall color harmony of the painting is not considered during the painting process, and color application lacks clear planning;

Average color expression ability: Children's fine motor skills have significantly improved, enabling them to complete coloring operations relatively well, and they can consciously limit the color to within the drawn outline, avoiding obvious color overflow problems, but their control over color matching and color richness is weak;

Good color expression ability: Building upon "average color expression ability," children further develop the awareness and ability to apply color evenly, and the number of colors used in the painting is significantly increased compared to the "average level," with a significant improvement in color richness;

Excellent color expression ability: In addition to possessing "good color expression ability," In addition to all the characteristics, young children can also use color as a carrier of emotion, effectively conveying their emotional state when drawing through color selection and application.

Based on the above research findings, this study divides children's color expression ability into 5 scoring levels, with the specific correspondence as follows:1 point corresponds to "the picture is basically uncolored"; 2 points correspond to the characteristic of "weak color expression ability" mentioned above; 3 points correspond to the characteristic of "average color expression ability" mentioned above; 4 points correspond to the characteristic of "good color expression

ability" mentioned above; 5 points correspond to the characteristic of "excellent color expression ability" mentioned above. Examples of pictures for each scoring are shown in Table 2 (right):

Table 2 Examples of scoring for composition ability and color expression ability

Composition ability score	Example	Reason	Color expression ability score	Example	Reason
1 point		The elements in the picture are randomly arranged and do not reflect good spatial organization logic.	1 point		The picture is basically uncolored.
2 points		The picture presents a simple parallel layout. Although the elements differ in size and shape, there is no complex spatial relationship.	2 points		The hand control during the coloring process is weak, resulting in irregular or overflowing coloring in some areas.
3 points		The picture presents a scattered layout, with a relatively clear central subject and a preliminary sense of spatial organization.	3 points		The coloring is regular and basically within the framed area, but the color selection is rather random and the aesthetics are poor.
4 points		The picture presents a scattered layout, with a very clear central subject and a preliminary sense of spatial organization.	4 points		The coloring is regular and basically within the framed area. The color selection is roughly consistent with the color of a "watermelon" in real life, and the aesthetics are good.

| 5 points | None | None | 5 points | | The coloring is regular and basically within the framed area. The color richness is good, and the emotional tension is high. |

2.4 Scoring Data Analysis

This study collected the artwork of 24 students after participating in this course as the experimental sample. To evaluate the artwork performance, this study invited two experts to score the artwork. Both experts have master's degrees in education and have worked in early childhood education for many years, possessing rich experience in early childhood art education and the ability to score children's artwork rigorously and meticulously.

2.4.1 Validation of Judges' scoring data

This paper conducts an inter-rater consistency test (ICC test) on the scoring results of two judges [11]. The intra-group correlation coefficient (ICC) is an indicator used to measure the degree of consistency in scoring when multiple raters rate the same group of subjects. It not only measures correlation but also assesses whether the scores are interchangeable. ICC is based on the analysis of variance (ANOVA) framework, which decomposes the total variance into variance among subjects, variance among raters, and variance of random error, thereby quantifying the reliability index of inter-rater consistency. Its core idea is that if the inter-rater consistency is high, the variance among subjects should be much greater than the variance caused by rater differences or random error. The formula is:

$$ICC = \frac{\sigma^2_{subject}}{\sigma^2_{subject} + \sigma^2_{rater} + \sigma^2_{error}} \tag{1}$$

where, $\sigma^2_{subject}$ is the variance component among the evaluated subjects (i.e., the variance component of the children's scores), σ^2_{rater} is the variance component among the scorers, σ^2_{error} where is the residual variance component. The ICC value ranges from 0 to 1, and the closer to 1, the higher the consistency. Generally, ICC < 0.50 indicates poor consistency, 0.50–0.75 indicates moderate consistency, 0.75–0.90 indicates good consistency, and > 0.90 indicates excellent consistency.

Further, to test whether the scoring standards used by the two judges on each scoring dimension have similar variance, that is, whether the difference in their scoring volatility reaches a significant level, this paper conducts a Levene test on the scoring differences on the four evaluation dimensions[12]. The Levene test is used to test whether the variances of two or more groups are equal, i.e., whether the homogeneity of variance assumption is satisfied, to verify the robustness of the data. The test statistic W is constructed as the ratio of the between-group mean square to the within-group mean square, which follows an F-distribution under the null hypothesis (equal variances).

$$T = \frac{SSB}{SSW/(2n-2)} = \frac{(2n-2)\cdot SSB}{SSW} \tag{2}$$

The larger the value, the more significant the difference in the dispersion (variance) of the scores of the two judges is relative to the random fluctuations within their respective scores.

Levene test p The value represents the probability of observing a difference as in the current sample if the variances among the judges are truly equal. The formula is as follows: $p = P(T \geq t_{obs}|H_0)$. Where, T is the test statistic, t_{obs} is the specific observed value of the test statistic calculated from the current sample data, $P(T \geq t_{obs}|H_0)$ represents the probability calculated under the condition that the null hypothesis H_0 is true, that is, the probability of obtaining a test statistic observation value that is at least as extreme as or more extreme than the current sample statistic.

2.4.2 Analysis of scoring results

To explore whether there are systematic differences in the scores of different groups on each assessment dimension, this study first tests the basic distribution of the scoring data of each group on each dimension, and selects an appropriate statistical comparison method based on the test results.

This study uses the Shapiro-Wilk test to assess the normality of the scores of each group on each dimension [13]. This test is applicable to situations with limited sample size. Its statistic W quantifies the degree of deviation by measuring the correlation between the sample data and the order statistic of the ideal normal distribution. The calculation formula is as follows:

$$W = \frac{\left(\sum_{i=1}^{n} a_i x_{(i)}\right)^2}{\sum_{i=1}^{n}(x_i - \bar{x})^2} \tag{3}$$

where, $x_1 \leq x_2 \leq \cdots \leq x_n$ represents the sample observations arranged in ascending order, $\bar{x}$ represents the sample mean, coefficient a_i The weight is derived from the expected value of the standard normal distribution order statistic. The value

of W ranges from (0, 1]. The closer the value is to 1, the greater the likelihood that the data follows a normal distribution.

Based on the premise of normality and homogeneity of variance (Levene test results), this study follows the decision-making process to select the inter-group difference test method:

If the data simultaneously satisfies normality and homogeneity of variance, then the parametric test method of one-way ANOVA (for comparisons of three or more groups) is used;

If the data satisfies the normal distribution but the variance is unequal, then Welch's ANOVA, which is robust to heteroscedasticity, is used.

If the data violates the normality assumption, then regardless of the result of homogeneity of variance, a nonparametric test is used.

For comparisons of multiple independent samples, the Kruskal-Wallis H test is used [14]. The formula for calculating the test statistic H is:

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(N+1) \tag{4}$$

where, k represents the number of groups, N represents the total sample size, n_i represents the sample size of theigroup,$R_i$represents the sample size of theirepresents the rank sum of all observations within the group.HThe statistic approximately follows an empirical distribution of the permutation statistic with $k-1$ Chi-square distribution. If the Kruskal-Wallis test result is significant, further post-hoc pairwise comparisons will be performed to determine the specific source of the difference. Meanwhile, considering the small sample size in this experiment, the permutation test was used as a supplementary method [15]. Its principle is to mix all N observations, randomly redistribute them to each group, and keep the sample size unchanged. Calculate the Kruskal-Wallis statistic for the data after each permutation$H^{(b)}$degrees of freedom, repeated$b$times. After permutation test$p$The value formula is:

$$p_{perm} = \frac{\sum_{b=1}^{B} I(H^{(b)} \geq H_{obs}) + 1}{B+1} \tag{5}$$

To explore which groups have differences in dimensions, this paper uses Dunn's Test post-hoc tests on groups with significant differences in each dimension under non-parametric tests. The principle is to adjust the standard error and use multiple comparison correction to make it applicable to multiple group comparison scenarios. The core idea is to compare the average rank of each group to determine which specific group pairs have significant differences [16]. Its$p$value calculation formula is:

$$p_{ij}^{Dunn} = \min\left(1, m \cdot \left[2 \times \left(1 - \Phi\left(\frac{\bar{R}_i - \bar{R}_j}{\sqrt{\frac{N(N+1)}{12}\left(\frac{1}{n_i} + \frac{1}{n_j}\right)C}}\right)\right)\right]\right) \tag{6}$$

If the p-value is less than the significance level$a$, then it is considered that there is a significant difference between groups.

3 RESULTS AND DISCUSSION

3.1 Experimental Results

3.1.1 Validation of Judges' scoring data

This paper first performs an inter-rater consistency test (ICC test) on the scoring results of the two judges. The test results show that the ICC value is 0.706 and the p-value is 0.002, indicating that there is a high degree of consistency between the two judges, and the scoring results have good reliability. Therefore, it can be considered that the review results of these two judges have strong reference value and are suitable as the basis for subsequent experimental analysis.

Furthermore, this paper conducts Levene tests on the scores given by the two judges. The results show that the Levene test statistic for fluency is 0.052 (p-value 0.820); for originality, it is 3.538 (p-value 0.066); for composition ability, it is 0.447 (p-value 0.507); and for color expression, it is 1.574 (p-value 0.216). These results indicate that the scoring criteria used by the two judges across all scoring dimensions have similar variances, and the differences in score volatility are not statistically significant, further demonstrating the objectivity of the scoring criteria in this study.

3.1.2 Analysis of Judges' scoring data

According to the established scoring rules, for each child's painting, scores were assigned to each dimension, and the average score of the two judges was used as the final score for the corresponding dimension of the child. Subsequently, according to the pre-defined group classifications, the mean and standard deviation of the scores for each dimension between groups were calculated. The results are shown in Table 3:

Table 3 Mean and Standard Deviation Table for Each Dimension of Children's Painting

Dimension	Group	Mean	Standard Deviation

	Control Group	3.19	0.3720
Fluency	Interactive Generation Group	3.36	1.1851
	Passive Reference Group	2.69	0.8839
	Control Group	3.63	1.2748
Originality	Interactive Generation Group	3.13	0.9161
	Passive Reference Group	2.63	0.7440
	Control Group	3.13	0.9161
Composition Ability	Interactive Generation Group	3.56	0.3204
	Passive Reference Group	2.75	0.4629
	Control Group	2.75	1.0690
Color Expression Ability	Interactive Generation Group	3.44	0.7289
	Passive Reference Group	2.44	1.0155

To explore the significance level of differences between groups across dimensions, this study first conducts a normality test on the scores between groups for each dimension. We conduct Shapiro-Wilk tests on the scores for each dimension of each group, and the results are shown in Table4.

Table 4 Shapiro-Wilk Test p-Values For Each Dimension

Control Group	0.0270	0.0846	0.8278	0.7833
Interactive Generation Group	0.0846	0.8278	0.0370	0.2861
Passive Reference Group	0.2914	0.4283	0.5224	0.9250

Due to the small sample size, this paper uses $p>0.1$ as the criterion for judging whether the data conforms to a normal distribution. The results show that only the fluency and originality scores of the control group and the fluency and composition ability scores of the interactive generation group conform to a normal distribution, while the others do not. Therefore, this paper uses a nonparametric test for multiple independent samples to test the significance. This paper uses the Kruskal-Wallis H test as a nonparametric test for multiple independent samples and uses the permutation test as a supplementary method. The results of the nonparametric tests for multiple independent samples in each dimension are shown in Table 5.

Table 5 Nonparametric Test Results for Multiple Independent Samples for Each Dimension

	Statistic (H)	p-value
Fluency	2.3906	0.3026
Originality	6.3478	0.0418
Composition Ability	11.0808	0.0039
Color Expression Ability	5.6062	0.0606

This paper uses $p>0.1$ as the criterion for judging whether there is a significant difference. The results revealed significant differences among the three groups in originality, composition ability, color expression ability, and total score. Next, we performed a post-hoc Dunn's Test on the groups with significant differences to determine which groups showed significant differences within each dimension. The results are shown in Figure 4:

	originality	Composition ability	Color expression ability
Group 1 vs. Group 2	0.8968	0.057	0.1994
Group 1 vs. Group 3	0.0365	1	1
Group 2 vs. Group 3	0.4259	0.0038	0.0807

Figure 4 Heatmap of Dunn's Test post-hoc test p-value_s

3.2 Discussion of Results

3.2.1 Description of phenomena

Based on the data in Table 5, differences exist in the performance of the control group, interactive generation group, and passive reference group across four dimensions: fluency, originality, composition ability, and color expression ability. Specifically, the interactive generation group scored higher than both the control group and the passive reference group in fluency, composition ability, and color expression ability; while the control group showed an advantage in originality, scoring higher than both the interactive generation group and the passive reference group. The passive reference group did not show a relative advantage in any of the above dimensions.

Combining the heatmap of p-values from the Dunn post-hoc test results (Figure 4), the following key phenomena can be observed:

In the comparison between the control group (Group 1) and the interactive generation group (Group 2), the differences between the two in the dimensions of composition ability and color expression ability are significant, indicating that the composition ability and color expression ability of the interactive generation group are better than those of the control group;

In the comparison between the control group (Group 1) and the passive reference group (Group 3), the difference in originality is significant, indicating that the originality of the control group is better than that of the passive reference group;

In the comparison between the interactive generation group (Group 2) and the passive reference group (Group 3), the differences between the two in the two dimensions of composition ability and color expression ability are significant, indicating that the composition ability and color expression ability of the interactive generation group are better than those of the passive reference group.

3.2.2 Phenomenon analysis

(1) Pre-painting AIGC projection has an inhibitory effect on children's originality in painting

The experimental results show that the originality of painting in the control group is significantly higher than that in the passive reference group. This phenomenon indicates that pre-painting AIGC image projection has an inhibitory effect on children's originality in painting, and this result is consistent with the cognitive laws of creative generation. From a cognitive perspective, AIGC-generated images often possess strong visual impact (such as exaggerated shapes and novel elements). This type of content is more likely to occupy children's cognition through strong sensory stimulation, leading to a deep memory of the reference image. This "high-intensity visual input" causes children's creative ideas to become overly focused on the themes and forms presented by AIGC, weakening their exploration of other creative sources—reducing their observation and thinking about the basic forms of "vehicles" in the real world, and ignoring the possibility of creatively combining them with previously encountered cartoons, animations, and other scenes. Ultimately, children's creativity falls into "path dependence," tending to directly reuse the visual paradigms provided by AIGC, rather than integrating diverse experiences through independent thinking to form unique ideas, resulting in a significant decrease in originality. Further comparison of the originality performance of the interactive generation group and the passive reference group reveals that, using AIGC as a reference, the interactive generation group exhibits superior originality. This difference reveals the crucial role of the "thought process in creative generation" in originality: In the interactive generation group, children submit creative requests to AIGC (such as "draw a car shaped like a cake") as needed during the drawing process. This process requires children to first clarify their own creative intentions and then transform those intentions into reference images through interaction with AIGC. AIGC serves only as an auxiliary tool for realizing creative ideas, not as the "leading source" of the ideas themselves. In contrast, children in the passive reference group passively receive images from AIGC before drawing, resulting in a lack of independent thinking and directly using reference images as creative templates, thus suppressing originality. From an educational perspective, the reduced originality in the passive reference group does more harm than good: while the static pre-input of AIGC provides visual inspiration for children, over-reliance on this type of "direct inspiration stimulation" weakens children's "autonomous exploration" and "deep thinking" abilities during the creative generation process, which is detrimental to the long-term development of their creative thinking.

In summary, this phenomenon indicates that in early childhood art education, the early stimulation of AIGC directly affects its role in creative generation. Pre-emptive, static, passive reference easily inhibits originality, while simultaneous thinking and reference during the creative process allows children to leverage the advantages of AIGC while preserving their autonomy in creative generation and maintaining or even enhancing their level of originality.

(2) AIGC can significantly improve children's design expression ability in painting

This study shows that young children who interact with artificial intelligence (AI) and refer to its generated content during the drawing process have significantly better design expression abilities than children who do not interact with AI throughout the process. This difference is clearly reflected in both the composition and color expression abilities, two core dimensions.

From the perspective of composition ability, experimental data shows that the average composition ability of middle-class children is generally in a transitional stage from "parallel composition" to "scattered composition." The formation of this stage characteristic is directly related to the current level of children's mental development: on the one hand, children's understanding of the spatial distribution patterns of objects in the real world is insufficient, and they

have not yet established a systematic physical spatial logic; on the other hand, their understanding and focus on the core content of the painting theme is limited, making it difficult to construct a spatial relationship of "prominent subject and clear hierarchy" in the picture, only achieving a basic listing or preliminary integration of elements. In contrast, AI-generated content (AIGC) has two major advantages: first, it can accurately analyze the spatial distribution patterns of objects in the real world (although occasional cognitive biases or generation errors may occur due to algorithmic limitations); second, it can accurately identify children's creative intentions and generate reference images that conform to physical spatial logic and children's expressive needs. Experimental results show that children in the interactive generation group who referenced AIGC maintained a relatively stable "scattered composition" level in their drawing ability—this phenomenon indicates that the immediate reference of AIGC not only helped children establish a clear understanding of the physical form (such as shape features and size proportions) of the creative theme "vehicles," but also strengthened their clarity regarding their creative goals. It is noteworthy that the passive reference group, which only statically encountered AIGC during the PPT presentation, did not show a significant difference in drawing ability compared to the control group that did not encounter AIGC ($p > 0.1$). This result reveals that the static image display stage before drawing cannot significantly improve children's drawing ability. From the perspective of early childhood cognitive development characteristics, this is mainly due to the fact that the cognitive comprehension ability of middle-class children is still in the developmental stage: even if they are exposed to reference images generated by AIGC in the early stage, it is difficult for them to effectively transform the spatial logic and composition experience contained therein into practical operational ability in the painting process.

In the dimension of color expression ability, the immediate interactive effect of AIGC is also significant. Data from the control group showed that the fine motor skills of kindergarten children were still relatively weak, and their performance in terms of the rationality of color selection and the accuracy of coloring was average. However, the interactive generation group of children who received real-time AIGC references showed significant improvement in both color selection ability and coloring quality. This difference can be explained from two aspects: First, kindergarten children have limited experience in color matching, and the reference images generated by AIGC provided them with concrete examples of color matching, making up for their lack of experience. Second, the mode of referring to AIGC as needed during the painting process helped children clarify the direction of color selection and painting, enhancing their confidence and patience in painting. Some children who originally had weak painting foundations and were afraid of the coloring process or even the painting process gradually got rid of their fear after interacting with AI and were able to complete the coloring and painting tasks more attentively. Some children said after class, "AI told me what colors to use, and drawing wasn't difficult at all." Furthermore, there was no significant difference in color expression ability between the passive reference group and the control group, further confirming the positive effect of AIGC on color ability. This improvement needs to be based on "dynamic reference synchronized with the creative process," as static, pre-emptive visual input cannot extend this influence to the coloring stage.

The core conclusion from the above analysis is that in early childhood art education, when children can access AIGC content on demand, AI can more fully realize its auxiliary value—not only can it effectively guide children to plan their creative content according to the logic of real physical space and artistic expression (such as clarifying "what to draw next," "how to arrange elements," and "what colors to choose"), thus promoting the improvement of composition and color expression abilities; it can also deepen children's physical cognition of the real world and their logical understanding of the content of their paintings, stimulating their interest in painting and enhancing their creative confidence. This finding further illustrates that compared to static, pre-emptive visual input, the dynamic reference mode of AIGC synchronized with the creative process aligns with children's cognitive patterns and can more accurately and effectively assist children's painting.

4 CONCLUSION

This study compares the differences in fluency, originality, composition, and color expression in children's paintings before and after the introduction of AI in different stages of their painting process. The main conclusions are as follows: First, AI-generated content stimulation significantly enhances children's composition and color expression abilities in the design and expression stage. AI-generated content stimulation not only helps children correctly establish their understanding of real-world physical logic and painting layout logic, but also enhances their confidence in the painting process. Second, direct stimulation with AI-generated content without children's critical thinking does not effectively maintain the originality of children's paintings.

However, due to the small sample size of this experiment, more large-scale standardized experiments are needed to corroborate the above conclusions. Also, since this paper only selected kindergarten students from a provincial capital city in eastern China for the experiment, and did not conduct in-depth research on their family backgrounds, the practical applicability of the results to young children has not yet been verified.

The conclusions of this study can provide a reference for the design of kindergarten painting courses. In the context of the gradual penetration of artificial intelligence technology into educational scenarios, guiding children to establish a correct understanding and reasonable use of AI is an important issue that needs attention in preschool education and is also one of the important teaching goals of preschool teachers. Although AI-generated content can significantly improve children's painting skills and broaden their horizons, it is still necessary to emphasize the children's active role in painting; the process of human creative generation cannot be replaced by AI.

COMPETING INTERESTS

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CULTIVATION PATHWAYS FOR INTELLIGENT LANGUAGE SERVICE PROFESSIONALS IN HIGHER VOCATIONAL FOREIGN LANGUAGE PROGRAMMES — A CASE STUDY OF THE CROSS-BORDER E-COMMERCE INDUSTRY

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Abstract: With the rapid development of AI technology and the rapid growth of the global cross-border e-commerce industry, the traditional foreign language professionals cultivation model is facing severe challenges. In this context, this paper investigates the cultivation pathway for intelligent language service professionals serving the cross-border e-commerce industry, and proposes a new professional cultivation paradigm that is grounded in linguistic competence, enhanced by industry-specific knowledge, and augmented by intelligent technologies. This aims to provide a reference for the transformation and upgrading of foreign language programmes in higher vocational colleges, enabling them to cultivate versatile and applied intelligent language service professionals to meet the needs of the digital economy era.

Keywords: Higher vocational foreign language programmes; Intelligent language service professionals; Cross-border e-commerce; Cultivation pathway

1 INTRODUCTION

The rapid advancement of artificial intelligence is reshaping global industries, including cross-border e-commerce. This transformation is driving a shift in the demand for language professionals—from traditional linguistic skills toward integrated competencies in technology, culture, and business[1]. Against this backdrop, higher vocational foreign language programmes face an urgent need to reform their cultivation models to remain relevant and responsive to industry evolution.

2 THE PRACTICAL DILEMMA: THE DISCONNECTION BETWEEN TRADITIONAL CULTIVATION AND THE DEMANDS OF THE INTELLIGENT ERA

In current higher vocational education, the training of foreign language professionals often remains anchored in conventional language-focused approaches, creating a disconnect from sectors like cross-border e-commerce that demand integrated competencies. This gap between cultivation models and industry needs represents a practical dilemma, mainly reflected in the following three aspects.

2.1 Technical Substitution: The Survival Crisis of General Translation Skills under the Impact of AI

Traditional foreign language education has centered on cultivating general skills in "listening, speaking, reading, writing, and translation." However, with the increasing sophistication of machine translation—particularly neural machine translation—routine and formulaic linguistic tasks are now widely handled by AI tools. Studies indicate that current neural machine translation achieves high-quality output across many language pairs, with accuracy in certain specialized domains approaching that of human translation[2]. If foreign language professionals possess only linguistic skills, lacking the industry-specific knowledge, cultural insight, and critical thinking that AI cannot easily replicate, their core competitiveness will be significantly eroded, leaving them vulnerable to technological marginalization. For vocational college students, skill homogenization with AI severely undermines their employability.

2.2 The Skills Gap: From Isolated Language Proficiency to Complex Industry Needs

In modern service industries, exemplified by cross-border e-commerce, the demand for foreign language professionals extends well beyond linguistic communication. Companies now require "language-plus-industry" competence—proficiency in the linguistic norms and digital vernacular of target markets, the ability to craft culturally resonant localized content, and the capacity to respond swiftly to customer inquiries. However, traditional foreign language curricula remain largely confined to language, literature, or generalized business topics, resulting in a pronounced disconnect from authentic industry scenarios. Consequently, while graduates may possess language skills, they often lack the ability to solve real-world business problems, creating a structural mismatch between talent cultivation and market needs[3].

2.3 Role Ambiguity: The Transformation of Language Competence from a Specialized Skill to a Foundational Utility

In the intelligent era, the nature of linguistic competence is fundamentally redefined. It is no longer viewed as a self-sufficient "specialized skill" capable of securing a stable career but is increasingly regarded as a "foundational skill" or "core literacy" for engaging in international business. Much as computer literacy has become a workplace standard, proficiency in a foreign language is now transforming into a baseline qualification for relevant industries. If educational programmes remain fixated on producing "language-only graduates", their career trajectories will inevitably narrow. Foreign language must be deeply integrated with a specific professional domain, effecting a decisive shift from "learning the language" to "using the language professionally".

At present, foreign language programmes in higher vocational colleges are confronting a critical transition. The traditional language-centered cultivation model, propelled by both technological advances and industrial shifts, now reveals a threefold challenge: technological disruption, structural misalignment, and identity ambiguity. Evidence from the cross-border e-commerce industry clearly demonstrates that what the market requires are professionals capable of leveraging language to accomplish specific industry tasks. Consequently, talent cultivation must pivot toward establishing a new paradigm for intelligent language services—one grounded in linguistic competence, structured by industry knowledge, and augmented by intelligent technology—to cultivate versatile professionals with truly irreplaceable value.

3 CORE COMPETENCE REQUIREMENTS FOR FOREIGN LANGUAGE PROFESSIONALS IN CROSS-BORDER E-COMMERCE

The development of the cross-border e-commerce industry does not demand foreign language professionals to transform into all-around operational experts but rather requires them to become the "language-culture-business" hub connecting China's supply chains with global consumer markets. The new competence requirements represent an expansion and deepening of their existing core foreign language skills, specifically manifested in the following:

3.1 Professionalization and Advancement of Language Competence: From Mastering General Foreign Languages to Serving the Cross-border E-commerce Industry

The primary strength of traditional foreign language professionals lies in their linguistic proficiency, but this ability must be applied with greater precision to serve the cross-border e-commerce industry.

3.1.1 Text generation and optimization competence of cross-border business
This represents the core competence that distinguishes students from those specializing in cross-border e-commerce. While the latter may recognize the importance of copywriting, the former should possess the ability to directly create and optimize high-quality cross-border business content. For instance, when drafting product copy, students can craft product titles, descriptions, and brand narratives that align with the target market's aesthetic preferences, consumer psychology, and search engine optimization principles. This requires not only grammatical accuracy but also persuasive marketing content that resonates culturally with consumers. When communicating with target customers, students can efficiently handle complex pres-ales inquiries and post-sales email complaints, demonstrating professionalism, a service-oriented mindset, and cross-cultural sensitivity. Effective linguistic communication effectively maintains brand image while enhancing customer satisfaction and repeat purchase rates.

3.1.2 Deep cross-cultural insights and localization competence
Foreign language professionals must transcend surface-level text translation to serve as "cultural advisors" for cross-border business operations teams. They must deeply understand the target market's social etiquette, values, holiday customs, and even legal environment. They should be able to assess whether product selling points or marketing campaigns conflict with cultural contexts and propose localized adjustments[4]. Additionally, foreign language professionals can lead or participate in the localization of product descriptions, user interfaces, and marketing materials, ensuring that information remains authentic and avoids cultural pitfalls while fostering emotional resonance.

3.2 Contextualization and Specialization of Business Knowledge: From General Principles to Cross-border E-commerce Practice

Business knowledge for foreign language professionals should no longer be confined to courses such as *International Trade Practices*. Instead, it should focus on language applications within cross-border e-commerce scenarios.

3.2.1 The "language services" perspective in cross-border e-commerce business
Unlike students specializing in cross-border e-commerce, students majoring in foreign languages are not required to possess expertise in platform algorithms or logistics optimization. Their essential competence lies in a clear understanding of how specific linguistic skills can be applied to address distinct challenges throughout the business workflow. For instance, during market research, students must collect, interpret, and analyze foreign-language industry reports, user reviews, and social media trends to inform product selection decisions. During customer service, students must comprehend common logistics and payment issues to professionally explain progress updates and address customer concerns.

3.2.2 Foundational understanding of mainstream cross-border e-commerce platforms

Familiarity with the fundamental rules, page structures, and common terminology of mainstream platforms such as Amazon, Alibaba.com, and Temu is not intended to train operators but to better craft listings compliant with platform specifications and understand the systemic context of customer service tickets.

3.3 Empowering Technological Literacy for Human Machine Synergy: Moving Beyond Tool Apprehension

With the swift development of AI technology, foreign language professionals ought to become masterful guides for intelligent tools, rather than passive users or individuals at risk of replacement.

3.3.1 Post-editing and content optimization competence
This constitutes an essential new competence for foreign language professionals. Students must be adept at utilizing machine translation for initial drafts and performing in-depth postediting that refines the text for terminological accuracy, cultural appropriateness, and persuasive impact, thereby elevating the final product to a native-like standard of quality[5].

3.3.2 Data-informed decision-making mindset
Students will be able to interpret basic sales data and sentiment tendencies in user reviews to identify potential issues in product descriptions and customer service dialogs. They can then apply linguistic skills to optimize these elements. For instance, by analyzing negative reviews, they can determine whether the issue stems from a "misunderstanding of product features" or "unclear documentation" and proceed to refine the copy accordingly.

The cross-border e-commerce industry demands a transformation of students majoring in foreign languages from "business students with English proficiency" to "language service specialists proficient in cross-border scenarios". Their core competitiveness lies in "deeper language application competence" and "more focused cross-cultural business insights".

4 REFORMING FOREIGN LANGUAGE PROFESSIONAL TRAINING IN HIGHER VOCATIONAL COLLEGES: WITH A FOCUS ON INTELLIGENT LANGUAGE SERVICE COMPETENCIES

In response to these new core competence demands for foreign language professionals in cross-border e-commerce, higher vocational colleges can adopt a reform approach characterized by a focus on language service competencies, tasks driven by typical e-commerce scenarios, and the use of intelligent technologies as efficiency tools.

4.1 Building an Integrated Curricular Module: Language Foundation, Cross-border Scenarios, and Technological Empowerment

4.1.1 Enhancing and upgrading the language foundation module
To move beyond traditional language-focused courses (e.g.*Comprehensive   English, Business English, Oral English*), the curriculum should integrate substantial authentic materials from cross-border e-commerce, such as product descriptions, social media ads, and customer service correspondences.Correspondingly, we recommend introducing applied courses such as *Cross-Border E-Commerce English*, *Intercultural Communication*, and *Localization Practice* can be introduced, thereby anchoring language acquisition firmly within professional scenarios[6].

4.1.2 Developing a dedicated cross-border e-commerce scenarios module
Distinct from comprehensive programmes in cross-border e-commerce, foreign language programmes can offer microcredentials or a course module in "Language Services for Cross-border E-commerce". Example courses include *Multilingual Copywriting for E-Commerce Platforms*, *Customer Relationship Management in Intercultural Contexts*, and *E-commerce Data Analysis*. The instructional goal is not to train students in operational tasks such as setting ad bids but to develop their ability to apply linguistic expertise within those business processes. For instance, in a course such as *E-commerce Data Analysis*, instructors can guide students to extract insights from reviews and social media data for the purpose of copywriting optimization.

4.1.3 Comprehensively integrating the technology-enabled module
This can be achieved by introducing applied courses such as *Language AI Tools* and   *Postediting Workflows*. The goal is to develop students' ability to critically evaluate, select, and optimize AI-generated contents, ensuring that they command the technology, not the reverse. Furthermore, even without those applied courses, educators should integrate the use of technological tools across the curriculum. For instance, students can be required to use AI for initial drafts (e.g., market reports, product copy), which must then be substantively refined by human expertise.

4.2 Innovating Pedagogy: Toward a Scenario- and Project-driven Model

4.2.1 Contextual case-based teaching
This approach integrates extensive, deidentified real-world cases into applied courses. Examples include analyzing cultural missteps behind product reviews in North America or drafting Germany-compliant eco-friendly marketing copies for electronics so that students construct knowledge by solving authentic business problems[7].

4.2.2 Project-driven learning
Project-driven learning integrates authentic cross-border e-commerce projects into microcredential modules. For instance, within a "Brand Globalization" project, student teams provide an end-to-end language service package for a local enterprise, covering everything from brand name and slogan translation to product description writing and social

media copy design. In a "Customer Service Optimization" project, they analyze existing email exchanges to identify linguistically or culturally induced communication gaps and then design an improved library of standardized responses. Through such hands-on projects, students experience the end-to-end language service workflow and articulate their professional value within the industry chain.

4.3 Redefining Assessment and Faculty Development: For Effective Reform Implementation

4.3.1 Outcome-based assessment reform
An outcome-based assessment mechanism centered on a "language services portfolio" should be established[8]. Such portfolios should include a high-quality localization package, an optimized multilingual knowledge base for customer service, or a targeted portfolio of cross-border marketing copies. This portfolio-based approach provides direct evidence of students' proficiency in intelligent language services for the cross-border e-commerce industry.

4.3.2 Shifting faculty roles toward language services mentors
The professional development of foreign language faculty should be advanced through two parallel strategies: practice-based upskilling and external recruitment. On the one hand, faculty should be required to complete regular industry placements at cross-border e-commerce or language service companies, where they lead or contribute to real projects, thereby evolving into industry-informed educators. On the other hand, higher vocational colleges should actively recruit industry mentors (e.g., localization project managers, overseas marketing directors) via industry-academy initiatives, workshops, and guest lectures, ensuring that the latest market demands are integrated directly into the curriculum.

This approach enables foreign language programmes at higher vocational colleges to secure their core identity as language service providers and establish a distinct niche within the cross-border e-commerce ecosystem. It cultivates a new generation of intelligent language service professionals who, for the AI era, are defined by their ability to retain deep linguistic expertise while mastering the tools to drive industry value.

5   CONCLUSION

Facing profound transformations, the future of higher vocational foreign language programmes hinges on a dual commitment: to preserve and to innovate. They must preserve their core advantage in language and intercultural competence, while innovating how—and how deeply—they integrate with industry. The cultivation of foreign language professionals should follow a reform pathway centered on a paradigm grounded in linguistic competence, structured by industry knowledge, and augmented by intelligent technology. This shifts the aim from producing general "business English graduates" to cultivating precise "intelligent language service professionals" for emerging sectors such as cross-border e-commerce. Such a transformation not only addresses challenges posed by AI but also revitalizes the role of foreign language programmes within vocational education, supplying Chinese enterprises going global with indispensable, practically grounded professionals of linguistic and cultural depth.

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CHARACTERISTICS OF TALENT DEMAND AND CONSTRUCTION OF A COLLABORATIVE CULTIVATION MECHANISM FOR SOCIAL GOVERNANCE IN BORDER AREAS

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Abstract: This paper aims to explore the characteristics of talent demand for social governance in border areas and the construction of a collaborative cultivation mechanism through a literature review. Based on the particularities and challenges of social governance in border regions, the study analyzes the diverse, professional, and regional characteristics of the demand for social governance talent. By reviewing social theory and collaborative governance theory, this paper proposes practical pathways involving the cultivation of social capital and the co-construction, co-governance, and sharing by multiple stakeholders. The goal is to provide a theoretical basis and practical guidance for the collaborative cultivation of social governance talent in border areas. The research finds that constructing an effective collaborative cultivation mechanism is of significant importance for enhancing the level of social governance in border regions.
Keywords: Border areas; Social governance; Collaborative cultivation; Talent demand; Multiple stakeholders

1 INTRODUCTION

1.1 Research Background

Border areas, as crucial strategic regions of a nation, have their stability and effectiveness in social governance directly impacting national security and social harmony. With the acceleration of globalization and the deepening of regional economic integration, border areas face increasingly complex and volatile social environments and governance challenges. In this context, the characteristics of talent demand for social governance in border areas and the construction of a collaborative cultivation mechanism have become focal points for both academia and practitioners. In recent years, although some studies have explored the particularities and challenges of social governance in border regions, there remains a lack of systematic and in-depth discussion on how to effectively cultivate talent that meets the social governance needs of border areas and how to construct a collaborative cultivation mechanism.

1.2 Research Purpose and Significance

As vital components of a nation, the stability and effectiveness of social governance in border areas are directly linked to national security and social harmony. However, due to the unique geographical environment, cultural diversity, and varying levels of economic development in border regions, social governance faces numerous challenges, such as talent shortages and insufficient governance capacity. Therefore, exploring the characteristics of talent demand for social governance and constructing a collaborative cultivation mechanism holds significant theoretical and practical importance. This study aims to clarify the characteristics of talent demand for social governance in border areas by analyzing existing literature and to propose an effective collaborative cultivation mechanism. It seeks to provide theoretical support and practical guidance for improving the level of social governance in border regions.

2 CHARACTERISTICS OF TALENT DEMAND FOR SOCIAL GOVERNANCE IN BORDER AREAS

2.1 Current State of Social Governance in Border Areas

2.1.1 Particularities of social governance in border areas

This section will elaborate on the particularities of social governance in border areas and how these particularities influence the construction of social governance mechanisms. Some researchers have studied a new public governance model in the Inner Mongolia border region, finding that this model comprises three functional systems: a multi-stakeholder linkage system for comprehensive social security management, an emergency management command system, and a public service system. These systems complement each other and have positively impacted the production and lives of farmers and herders in border areas. Furthermore, other studies have analyzed innovative pathways for social governance mechanisms in ethnic border regions, pointing out that social governance in these areas possesses

characteristics of borderland and ethnicity. These particularities necessitate considering the influences of economic, social, institutional, ideological, and cultural factors in the governance process[1]. Relevant research has further explored the process of socialization of social governance in border areas, emphasizing relationship building based on public services, the shift from "collaborative governance" to "multi-party cooperation," and multi-domain cooperation in social governance. In summary, the particularities of social governance in border areas require that the construction of social governance mechanisms fully considers their regional, ethnic, and social characteristics to achieve effective governance.

2.1.2 Challenges facing social governance in border areas

This section will detail the challenges confronting social governance in border areas and how these challenges affect its effectiveness. Some studies have noted that with developments in the international situation and the comprehensive advancement of reforms in China's political, economic, and social spheres, demands for comprehensive social security management, emergency management capabilities, and public services in border areas have rapidly increased, imposing higher requirements on local governments[2]. Additionally, relevant research has indicated that economic, social, institutional, ideological, and cultural factors in ethnic border regions influence the process and outcomes of governance. Therefore, innovating social governance mechanisms in these areas must be centered on building a positive interactive relationship between the state and society, addressing political, economic, social, and cultural dimensions[1]. Other researchers have analyzed the practical dilemmas of grassroots social governance in western border regions, identifying issues such as insufficient public services and social security, strong public spirit and participation awareness among border residents, the limitation of governance scope and depth by unidirectional governance approaches, suboptimal allocation of governance resources, and the inadequacy of the traditional government-dominated management model[3]. Relevant studies have also highlighted the challenges social organizations face from institutional, environmental, and capacity perspectives when participating in and promoting the socialization of social governance in border areas[4]. In summary, social governance in border areas faces multifaceted challenges, including comprehensive social security management, emergency management capabilities, public service demands, lagging governance concepts, insufficient optimization of governance resources, and limitations in social organization capacity. These challenges necessitate multi-dimensional innovation in governance mechanisms.

2.2 Characteristics of Talent Demand for Social Governance

2.2.1 Diversity of talent demand

This section will explore the diversity of talent demand for social governance in border areas. Through literature review and qualitative analysis, some researchers have pointed out that the development and attraction of high-level talent in remote ethnic minority areas face numerous problems, such as serious brain drain and inflexible talent management markets. They suggested that the state should formulate tailored support policies and optimize the environment for the allocation and utilization of human resources in ethnic minority regions. Furthermore, through case studies and field research, other studies have found that social governance innovation in multi-ethnic border regions requires enhancing the capacity to serve various ethnic groups and strengthening their ethnic, social, and national identities. They emphasized the importance of social governance innovation in multi-ethnic border regions, particularly in improving border management and control efficiency[5]. In summary, talent demand for social governance in border areas exhibits diversity, requiring collaborative cultivation from multiple aspects such as policy support, optimization of human resource allocation, enhancement of service capabilities, and strengthening of ethnic identity.

2.2.2 Professionalism of talent demand

This section will discuss the demand for professional talent in border area social governance. Some researchers have pointed out that current grassroots social management practices in China suffer from unclear relationships among management entities and underdevelopment of some participating entities. They argued for strengthening social governance mechanisms to improve grassroots social management and facilitate its transition towards social governance. They emphasized the core role of talent in grassroots social management, considering it the most fundamental guarantee for maintaining high-quality operation[6]. Additionally, relevant studies have noted that the development and attraction of high-level talent in China's remote ethnic minority areas are particularly problematic, characterized by a small talent pool and a severe shortage of high-level professionals. Through literature review and qualitative analysis, they proposed countermeasures and suggestions, highlighting the importance of talent in promoting development in these regions. In summary, the demand for professional talent in border area social governance is evident, requiring strengthened cultivation and attraction of talent from multiple aspects to promote regional development.

2.2.3 Regional specificity of talent demand

This section will examine the regional characteristics of talent demand for social governance in border areas and their impact on talent cultivation mechanisms. In research on local governance in China's ethnic regions, some scholars have noted that social governance in ethnic regions has particularities requiring research based on actual conditions. This indicates that talent demand in border area social governance possesses distinct regional characteristics. Furthermore, in studies on high-level talent development and attraction in remote ethnic minority areas, researchers have found issues of insufficient total talent and a shortage of high-level professionals, further illustrating the regional specificity of talent demand. Relevant research exploring the inherent compatibility between social capital and borderland social governance has pointed out that the insufficient stock of social capital in ethnic border regions severely constrains local

development. This suggests that special attention must be paid to cultivating social capital in border area social governance to foster innovation in governance practices[7]. In summary, talent demand for social governance in border areas has clear regional characteristics. Therefore, constructing a collaborative cultivation mechanism must fully consider the particularities of these regions to ensure that talent cultivation meets practical needs.

3 THEORETICAL FOUNDATIONS FOR CONSTRUCTING A COLLABORATIVE CULTIVATION MECHANISM

3.1 Social Theory

3.1.1 Development of social governance theory
This section will explore the development of social governance theory and its application in different regions and contexts. In research on mechanisms and models of grassroots social governance in China, some scholars have noted that governance theory has risen to become a fundamental theory for state governance in China, holding significant importance for comprehensively guiding social management work. They argued that current grassroots social management practices suffer from unclear relationships among management entities and require strengthened social governance mechanisms for improvement. Relevant research focusing on local governance in China's ethnic regions has emphasized that the rise of governance theory has laid a solid foundation for conducting local governance work in these areas. It has also pointed out the need to innovate research methods, seek new approaches, promptly summarize experiences from local governance practices, and explore local governance models and pathways suited to the actual conditions of ethnic regions. Other studies have further discussed theoretical considerations for innovating social governance mechanisms in ethnic border regions, arguing that social governance in the Chinese context must be premised on upholding the Party's leadership and adhering to and improving socialism. They proposed that innovation in social governance mechanisms in ethnic border regions should address political, economic, social, and cultural dimensions. From the perspective of enhancing grassroots social governance capacity, some researchers have emphasized the importance of comprehensively strengthening this capacity, noting the need to actively explore new governance channels, properly handle relationships among the government, society, and market, and continuously optimize the level of grassroots social governance and governing capabilities. Relevant research has analyzed the socialization of social governance in border areas, indicating that it involves integrating social resources and mobilizing social forces and public participation while adhering to Party committee leadership and government responsibility. In summary, the development of social governance theory provides a solid theoretical foundation and practical guidance for social governance in different regions and contexts in China, emphasizing the importance of multi-stakeholder participation, mobilization of social forces, and the leading role of the Party and government.

3.1.2 Application of social governance theory in border areas
This section will discuss the application of social governance theory in border areas, analyzing the particularities and influencing factors of social governance there. Some studies have studied a new public governance model in the Inner Mongolia border region, finding that this model effectively improved the quality of life for farmers and herders by integrating three functional systems: a multi-stakeholder linkage system for comprehensive social security management, an emergency management command system, and a public service system. Furthermore, relevant research has explored innovative pathways for social governance mechanisms in ethnic border regions, noting that social governance in these areas possesses characteristics of borderland and ethnicity, requiring innovation in governance mechanisms from political, economic, social, and cultural dimensions. Taking Xishuangbanna Prefecture as an example, some studies have studied social governance innovation in multi-ethnic border regions, emphasizing the importance of enhancing the capacity to serve various ethnic groups and strengthening ethnic and social identities. Other research has analyzed the action strategies of stakeholders in the socialization process of social governance in border areas, suggesting that socialization can be achieved by integrating social resources and mobilizing social forces and public participation. In summary, social governance in border areas needs to combine their particularities, enhance governance effectiveness, and promote social harmony and stability through the participation of multiple stakeholders and the construction of innovative governance mechanisms adapted to local conditions.

3.2 Collaborative Governance Theory

3.2.1 Core concepts of collaborative governance theory
This section will explore the core concepts of collaborative governance theory and their application in border area social governance. Some scholars have noted that governance theory has risen to become a fundamental theory for state governance, emphasizing the diversification of governance subjects, the basic approach of multi-party consultation over coercion in addressing public affairs, and the equality among participating entities. Furthermore, some researchers, starting from the actual conditions of ethnic regions, have highlighted the importance of governance theory in local governance, believing it can help explore local governance models and pathways suited to ethnic regions[8]. Relevant studies have proposed that collaborative governance theory aims to integrate resources from government and non-governmental stakeholders to address governance challenges. They argued that building a collaborative governance framework can promote democracy, improve livelihoods, coordinate inter-ethnic relations, and consolidate border security[9]. Some studies have taken specific border city communities as the research object, using methods such as field interviews, questionnaires, and literature review to analyze the current status, effectiveness, and problems of

collaborative governance, proposing countermeasures and suggestions[10]. In summary, the core of collaborative governance theory lies in the organic collaboration among governance subjects. Through consultation and cooperation among multiple stakeholders, it establishes a cooperation model of joint deliberation, action, risk-sharing, and benefit-sharing, maximizing resource integration, resolving conflicts of interest, and promoting the realization of public interests, providing a solid theoretical foundation for social governance in border areas.

3.2.2 Application of collaborative governance theory in border area social governance

This section will discuss the application and importance of collaborative governance theory in border area social governance. Some studies have studied a new public governance model in the Inner Mongolia border region, finding that this model formed a multi-stakeholder linkage governance mechanism by integrating three functional systems, playing a positive role in enhancing social governance effectiveness in border areas. Furthermore, some researchers have pointed out that grassroots social governance in western border regions faces transnational, public, and cross-domain issues. It requires establishing new governance concepts such as good governance and modernization and promoting the co-construction, co-governance, and sharing by multiple stakeholders to achieve harmony and stability at the grassroots level. Some studies have taken specific border city communities as examples, through field interviews, questionnaires, and literature review, analyzing the current status and effectiveness of community collaborative governance. They proposed that in the transition from community management to community governance, multi-stakeholder participation in urban community collaborative governance is an inevitable trend for future urban communities. In summary, collaborative governance theory holds significant application value in border area social governance. Through the collaborative cooperation of multiple stakeholders, it can effectively address complex social governance issues and promote harmony, stability, and development in border regions.

4 PRACTICAL PATHWAYS FOR CONSTRUCTING A COLLABORATIVE CULTIVATION MECHANISM

4.1 Cultivation of Social Capital

4.1.1 The connotation of social capital

This section will explore the connotation of social capital and its role in social governance. Some researchers have pointed out that social capital is a structured social resource that can be invested in and utilized by actors through social network relationships to achieve their goals. Furthermore, relevant studies have emphasized the importance of social capital in borderland social governance, arguing that it holds significant value in integrating social values, compensating for institutional shortcomings in the governance process, broadening resource pooling for social governance, and more. They also noted that the composition and nature of social capital influence the behavior and motivations of social individuals and collectives, affecting institutional arrangements and governance models in social governance. In summary, social capital plays a crucial role in social governance, and its connotation and functions require further in-depth research to better guide social governance practices.

4.1.2 The role of social capital in border area social governance

This section will discuss the role of social capital in border area social governance and how to enhance governance capacity through its cultivation. Some studies have studied the importance of social capital in borderland social governance, indicating its significant value in integrating social values, compensating for institutional shortcomings, broadening resource pooling for social governance, promoting inter-ethnic interaction, and enhancing governance capacity in ethnic border regions. Furthermore, through case analysis of specific border prefectures, relevant research has emphasized the importance of enhancing the capacity to serve various ethnic groups and effectively managing borders, considering it key to social governance innovation in multi-ethnic border regions. In summary, social capital plays a vital role in border area social governance. By cultivating social capital, governance capacity can be effectively improved, promoting harmony and stability in border regions.

4.2 Co-Construction, Co-Governance, And Sharing By Multiple Stakeholders

4.2.1 Composition of multiple stakeholders

This section will explore the composition and roles of multiple stakeholders in border area social governance. Some studies have studied a new public governance model in the Inner Mongolia border region, finding that this model achieved the common participation of multiple stakeholders by integrating three systems, positively impacting the production and lives of farmers and herders. Furthermore, through case analysis of specific border prefectures, relevant research has suggested that social governance innovation in multi-ethnic border regions should stimulate the enthusiasm of governance subjects and enhance their capacity to serve various ethnic groups. From a broader perspective on grassroots social governance mechanisms, some researchers have emphasized the importance of multi-party collaboration and equal participation, arguing that grassroots social governance mechanisms should promote interconnection and coordination among various subjects. Relevant studies have further analyzed the action strategies of social organizations as stakeholders in border area social governance, pointing out the challenges these organizations face from institutional, environmental, and capacity perspectives when participating in and promoting the socialization of social governance. From the perspective of a social governance community, some researchers have emphasized the importance of the people as one of the governance subjects. They noted that in multi-ethnic border regions, the participation of various ethnic groups helps strengthen interactions, exchanges, and integration, meeting their aspirations for a better life. In summary, the multiple stakeholders in border area social governance include the

government, social organizations, enterprises, citizens, etc. Each plays different roles in the governance process, jointly promoting the modernization of social governance.

4.2.2 Roles of multiple stakeholders in social governance

This section will discuss the roles of multiple stakeholders in social governance and how they interact to achieve effective governance. Some studies have studied a new public governance model in the Inner Mongolia border region, finding that multiple stakeholders jointly participate in public governance, including police, citizens, military, government, and enterprises, participating through multiple channels to provide public services, which helps build a public service supply model. Furthermore, some researchers have analyzed mechanisms and models of grassroots social governance, pointing out that grassroots social governance emphasizes multi-party collaboration and equal participation, achieving multi-stakeholder involvement by increasing the participation of citizens and social organizations based on the original governance structure. Relevant research has further explored innovation in social governance mechanisms in ethnic border regions, emphasizing that the governance process must be centered on building a positive interactive relationship between the state and society, addressing political, economic, social, and cultural dimensions to promote innovation in social governance mechanisms. Through case analysis of specific border prefectures, some studies have proposed that social governance innovation in multi-ethnic border regions should be based on reality and focus on the long term, fully utilizing current social governance advantages to achieve resource integration and complementary strengths among administrative, market, and social systems. Taking specific multi-ethnic border regions as examples, relevant research has emphasized the significance of a social governance community in advancing borderland social governance. They noted that the operation of a social governance community is inseparable from the joint participation of multiple parties, including the Party as the core leader, the government as the main responsible body, society as the collaborative coordinator, and the people as the key subjects[11]. In summary, multiple stakeholders play crucial roles in social governance. Through cooperation and consultation, they jointly achieve social governance objectives. Therefore, constructing a multi-stakeholder collaborative governance mechanism is key to enhancing social governance capacity.

4.2.3 Mechanisms for co-construction, co-governance, and sharing by multiple stakeholders

This section will explore how multiple stakeholders can enhance the level of social governance in border areas through mechanisms of co-construction, co-governance, and sharing. Some studies have studied a new public governance model in the Inner Mongolia border region, noting that this model effectively improved social stability in border areas by integrating relevant systems, achieving multi-stakeholder participation in social governance. Furthermore, relevant research has discussed the construction of a collaborative governance framework for grassroots society in China's border rural areas, emphasizing that by cultivating social capital, providing institutional frameworks, and designing collaborative processes, the shortcomings of the traditional "township administration and village self-governance" framework can be addressed, promoting democracy, improving livelihoods, coordinating inter-ethnic relations, and consolidating border security. Some researchers have analyzed the socialization of social governance in border areas, indicating that by integrating social resources and mobilizing social forces and public participation, the socialization of social governance can be achieved. At the same time, social organizations face challenges from institutional, environmental, and capacity perspectives when participating in and promoting this socialization. Relevant studies have studied boundary governance in grassroots social governance, proposing the construction of a boundary collaborative governance network involving adjacent government departments, market entities, social entities, and the public. This network achieves collaborative co-governance among governments through collaborative governance, jointly promoting regional economic and social development[12]. In summary, the mechanism of co-construction, co-governance, and sharing by multiple stakeholders plays a significant role in border area social governance. By integrating resources and strengths from all parties, The level of social governance can be effectively enhanced, promoting regional stability and development.

5 CONCLUSION

5.1 Research Summary

Through the study on the characteristics of talent demand and the construction of a collaborative cultivation mechanism for social governance in border areas, this paper systematically reviews the theoretical foundations and practical pathways in related fields. The research finds that social governance in border areas possesses particularities and complexities, resulting in a demand for social governance talent characterized by diversity, professionalism, and regional specificity. The construction of a collaborative cultivation mechanism needs to rely on social theory and collaborative governance theory, forming an effective supply system for social governance talent through the cultivation of social capital and the co-construction, co-governance, and sharing by multiple stakeholders. However, existing research still has shortcomings in empirical analysis and specific operational aspects. Future research should further explore how to effectively implement collaborative cultivation mechanisms in specific contexts to better meet the talent demand for social governance in border areas[13].

5.2 Research Outlook

Through the study on the characteristics of talent demand and the construction of a collaborative cultivation mechanism for social governance in border areas, this paper systematically reviews the theoretical foundations and practical

pathways in related fields. The research finds that social governance in border areas possesses particularities and complexities, resulting in a demand for social governance talent characterized by diversity, professionalism, and regional specificity. The construction of a collaborative cultivation mechanism needs to rely on social theory and collaborative governance theory, forming an effective supply system for social governance talent through the cultivation of social capital and the co-construction, co-governance, and sharing by multiple stakeholders. However, existing research still has shortcomings. Future studies could delve deeper into the following aspects: first, further specifying the concrete characteristics of talent demand for social governance in border areas to guide more precise talent cultivation; second, exploring the applicability and effectiveness of collaborative cultivation mechanisms in different border regions to promote the optimization and improvement of these mechanisms; third, strengthening empirical research, using methods such as case studies to verify the actual effects of collaborative cultivation mechanisms and provide a scientific basis for policy formulation.

COMPETING INTERESTS

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COLLEGE ENGLISH TEACHING REFORM DRIVEN BY THE TRANSLATION COMPETITION OF UNDERSTANDING CONTEMPORARY CHINA

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Abstract: This study implemented a College English teaching model for non-English majors, driven by the translation competition of "Understanding Contemporary China" and theoretically framed by the Production-Oriented Approach (POA). A 12-week teaching experiment involving two non-English major classes was conducted, employing translation tests, competition performance analysis, classroom observation, and a questionnaire to systematically assess the impact of the model on students' translation competence, thematic cognition, and international communication awareness. Findings indicates that the model significantly enhances students' accuracy in translating core Chinese terminology, deepens their thematic understanding, and strengthens their intercultural communication awareness, thereby establishing an effective cycle of promoting learning through competition and application through learning. The research offers practical insights for integrating competitions into College English instruction and suggests future directions in pedagogical synergy, technology integration, and cross-institutional collaboration.

Keywords: Translation competition; POA; English teaching reform; Intercultural awareness; Understanding Contemporary China

1 INTRODUCTION

Against the backdrop of telling China's story well being elevated to a national strategy for international communication, foreign language education has been entrusted with the new mission of shaping the national image and contending for international discourse power [1,2]. As one of the most widely offered courses in universities, College English should play a central role in enhancing the Chinese narrative competence of the students. However, the current teaching system remains predominantly focused on linguistic skill training, characterized by fragmented content and a lack of context. This results in students who, despite possessing language proficiency, struggle to effectively explain China's path and wisdom in English, creating a competency gap of knowing the language but not the narrative [3,4]. Consequently, a misalignment exists between College English education and the demands of national strategic needs.

The ongoing promotion of the "Understanding Contemporary China" textbook series and the translation competition of the FLTRP·Guocai Cup (Foreign Language Teaching and Research Press·Guocai Cup) provides a practical opportunity to address this dilemma. The competition, with its focus on core discourses such as China's path, governance, and logic, cultivates a sense of national identity and belonging and a global perspective. By providing official reference translations, it integrates authentic external communication tasks into the classroom. Translation theory posits that translation is not merely linguistic transfer but a deeper process of intercultural meaning negotiation and discursive practice [5,6]. This provides a theoretical foundation for using translation competitions to boost narrative competence. Empirical research further indicates that such competitions help enhance learning motivation, intercultural sensitivity, and text production quality [7,8]. Current research primarily targets graduate students or translation majors, leaving a relative dearth of systematic studies on integrating translation competitions into College English teaching for non-English majors.

In response to this challenge, the present study is grounded in the Production-Oriented Approach (POA) proposed by Wen [9,10]. POA provides a pedagogical framework for integrating competitions into the curriculum through a process driven by authentic tasks, supported by selective input and skill scaffolding, and evaluated via multi-faceted feedback, thus forming an integrated learning-using cycle. By embedding competition tasks within this framework, a teaching chain that encompasses translating national discourse, adapting it for international audiences, and facilitating multimodal communication can be established while preserving the generalist nature of the College English course. This enables the construction of a new teaching model that aligns with national communication strategies. Accordingly, the study attempts to construct and implement a competition-driven College English teaching model for non-English majors. Through a semester-long teaching experiment, it systematically investigates the impact of the model on students' translation competence, thematic cognition, and international communication awareness. The findings aim to provide pedagogical references and practical pathways for College English to serve the national strategy for international communication, particularly in contexts of relatively advantaged learner profiles.

2 LITERATURE REVIEW

Recent research on telling China's story well has progressed along three dimensions: teaching, translation, and communication. In the teaching dimension, exploration has centered on textbook reconstruction and the integration of curriculum-based ideological and political education. Xiao [11] and Tian & Mo [12] focus on College English textbooks, proposing the principle of systematic embedding of narrative elements, thereby providing a content vehicle for telling China's story well. Chan [13] and Yue & Zhuang [14], from the perspective of curriculum-based ideological and political education, emphasize incorporating intercultural narrative competence into the evaluation system, aiming to achieve an intrinsic integration of value guidance and competency cultivation.

In the translation dimension, Zheng [15] validates the effectiveness of progressive training across terminology, discourse, and culture for non-foreign language majors. Bao & Tao [16] introduce external publicity translation projects into translation courses for English majors in science and engineering universities, emphasizing the use of authentic or simulated translation scenarios as teaching materials. Their research finds that such practices significantly enhance students' intercultural awareness and translation practice ability, effectively aligning with national strategic needs for external communication and strengthening the integration of translation teaching with curriculum-based ideological and political education. Zhao [17], based on large language model analysis, points out defects such as keyword omission and fragmented context in the Chinese cultural narratives within CET-4 and CET-6 translation tests. These mainly manifest as insufficient representation of revolutionary culture, absence of modern political discourse, and weak individual narratives, affecting the complete expression and communication effectiveness of China's stories.

In the communication dimension, Cai [18] further emphasizes that the key to international communication competence is not general language proficiency, but discursive competence, namely the ability to adjust expression according to disciplinary norms and audience context. This view is corroborated at the curricular level: Wu [19], through a content analysis of 58 English major training programs, points out that current programs prioritize educational functions over communicative ones, with mass communication courses occupying an extremely low proportion. This results in students lacking both practical ability in international communication and awareness of discourse conversion. Translation plays a crucial role in this process, often intertwined with power and ideology [20]. This necessitates that translation teaching transcend mere skill training and guide students to recognize and actively construct discourse conducive to the national image [21]. In recent years, the integration of translation teaching and curriculum-based ideological and political education has gradually become a research focus, with systematic implementation emerging at the interdisciplinary level. Based on an empirical study of a Master's program in Translation and International Communication, Ren and Zhao [22] construct an integrated training model. By synthesizing dual-disciplinary content, authentic tasks, and multi-dimensional evaluation, the model provides a complete practical pathway for developing students' interdisciplinary narrative competence and audience awareness, thereby addressing the complex demands of telling China's stories well.

Building on the need for such integrated approaches, this study recognizes that while existing research offers valuable insights within single dimensions, the dynamic nexus among teaching, competition, and communication merits further empirical exploration. To contribute to this broader understanding, the present research is grounded in the Production-Oriented Approach (POA) proposed by Wen. It seeks to investigate how translation competitions can be productively woven into the fabric of College English instruction for non-English majors, thereby expanding the repertoire of pedagogical strategies available for cultivating international communication competence

3 CONSTRUCTION OF A TRANSLATION COMPETITION-DRIVEN COLLEGE ENGLISH TEACHING MODEL

3.1 Research Design and Methods

This study selected two non-English major classes (one from the School of Public Management and one from the School of Materials and Energy, totaling approximately 100 students) from a Double First-Class university. These classes represented both humanities or social sciences and science or engineering backgrounds, offering certain disciplinary representativeness. A 12-week teaching practice integrating reading, writing, and translation was implemented (within a 16-week semester, with 4 weeks dedicated to the audio-visual and speaking course).

Data for assessing the model's effectiveness were collected primarily through pre-and post-translation tests, classroom observation, and a questionnaire. Additionally, an analysis of competition performance was conducted. The competition performance analysis, focused on students' translations in mock and preliminary rounds, served primarily as a source of formative feedback to inform real-time instructional adjustments and to provide qualitative insights into the development of students' discourse conversion strategies. Its findings are thus integrated into the qualitative discussion of teaching optimization, whereas the quantitative assessment of the model's effectiveness relies principally on the pre-post translation tests and the questionnaire survey.

The translation tests focused on key terms reflecting contemporary Chinese development concepts, such as innovation-driven development, resilience of industrial and supply chains, and strengthening the country through science and technology, as well as traditional cultural concepts, including harmonizing all nations, following the way of nature, an open mind as vast as a valley, and cultivating oneself, regulating the family, governing the state, and bringing peace to the world, and so on.

Competition performance analysis examined students' translations of themed passages in mock competitions and the university-level preliminary round, for example, on topics such as common values of humanity, building a world-class,

market-oriented, law-based, and internationalized business environment, as well as translation tasks designed around key policy terms like carbon peaking and carbon neutrality and their integration into broader narratives of ecological civilization.

Classroom observation recorded students' ability to use textbook knowledge to explain Chinese-specific practices during group tasks. The questionnaire collected student feedback on thematic cognition and their evaluation of the teaching model.

The teaching reform took the translation competition of FLTRP·Guocai Cup as its core driver, deeply integrating with four reading and writing unit themes from the semester: Unit 1 (Logic and Rational Discourse Construction), Unit 2 (Cultural Identity and Aesthetic Discourse Power), Unit 5 (Labor Narrative and Social Development Perspective), and Unit 6 (Global Issues and the Chinese Approach). This constructed a teaching process in the sequence of driving, facilitating, evaluating, and transforming, focused on cultivating translation competence for Chinese-specific content and intercultural communication ability.

The choice of the translation competition as the core teaching driver was based on several considerations. First, the competition system covers three levels: university preliminary, provincial semi-final, and national final, with clearly graded question types and difficulty, facilitating a step-by-step teaching approach from the basics. The university-level preliminary round focuses on key term translation and short non-literary translation, aligning closely with College English course content and serving as a suitable starting platform for non-English majors. Second, the competition content closely follows the theme of Understanding Contemporary China, involving multi-dimensional issues such as political discourse, traditional culture, and social development, which highly aligns with the modular teaching content designed for this study. Third, the competition provides official reference translations and grading criteria, offering clear benchmarks for teaching evaluation and student self-study, contributing to a virtuous cycle of promoting learning through competition and improving through evaluation. Therefore, using this competition as a lever can effectively connect classroom learning, competency training, and authentic communication tasks, assisting students in transitioning from the role of language learner to cultural communicator.

This reform, based on POA, constructed a teaching model driven by competition tasks, supported by modular content, safeguarded by multi-dimensional evaluation, and extended through outcome transformation, forming a four-stage teaching cycle consisting of driving, facilitating, evaluating, and transforming (See Figure 1). This model aims to achieve the coordinated development of language ability, thematic cognition, and intercultural communication literacy through the drive of authentic competition tasks. Specifically: it takes the FLTRP·Guocai Cup translation competition as the starting drive; systematically facilitates learning through three modules (political discourse, traditional culture, and practical cases); implements evaluation via a multi-faceted mechanism consisting of peer review, teacher feedback, and competition judging; and finally transforms learning outcomes into a translation resource bank, learning platform dissemination, and thematic sharing sessions, completing the transformation and feeding back into teaching, thereby achieving the integrated teaching objective of learning, competing, and applying.
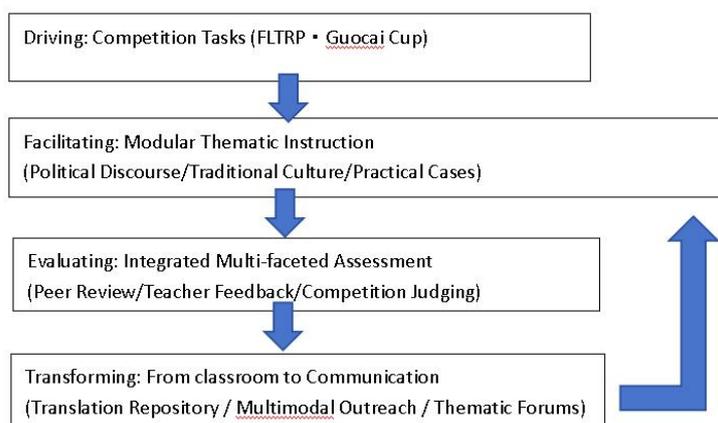

Figure 1 Framework of the College English Teaching Model Driven by the Translation Competition

3.2 The Driving Stage: Anchoring Learning Objectives with Authentic Competition Tasks

This stage, following the POA principle of production-driven, takes the translation competition task of FLTRP·Guocai Cup as the starting point. By designing challenging, authentic production tasks, it aims to stimulate student motivation and clarify learning goals. Unit teaching content is deeply integrated with competition themes, forming a cyclical driving mechanism of production task guidance coupled with input learning support.

Unit 1 (Logic and Rational Discourse Construction): Using the task of explaining the concept of Lingnan architectural preservation and revitalization as the production output, students were guided to utilize logical fallacy identification tools from the text "Love and Logic: The Story of a Fallacy". Emphasis was placed on training students to avoid the trap of Hasty Generalization, not simplistically equating cultural heritage protection with closed-off preservation. Instead, through analyzing specific practices, such as how the Guangdong Museum uses digital technology to restore Chen Clan Academy brick carvings in exhibitions and dynamically present the streetscape ecology of Cantonese

vernacular Qilou buildings, students systematically explained how preservation and innovation complement each other. This aimed to construct a cultural narrative with both historical authenticity and contemporary explanatory power, responding to the international community's one-sided perception of Chinese cultural heritage as ossified or stagnant.

Unit 2 (Cultural Identity and Aesthetic Discourse Power): Based on the text "The Misleading Perception of Beauty" and its discussion on the social construction of aesthetics, the production task centered on how to explain core concepts of Chinese aesthetics to an international audience. This guided students to reflect on and construct Chinese aesthetic discourse. How to explain in English concepts like the beauty of harmony and equilibrium (zhonghe zhi mei) or vividness of spirit and rhythm (qiyun shengdong), or contemporary ideas of diverse aesthetics and cultural confidence? How to respond to stereotypical international presentations of Eastern aesthetics? When translating terms like landscape artistic conception (shanshui yijing) or guochao (national trend), students were encouraged not merely to seek literal equivalence but to supplement cultural contextual explanations, making them understandable and culturally profound narratives.

Unit 5 (Labor Narrative and Social Development Perspective): Using the task of comparing Chinese and Western labor narratives to explain Chinese labor values as the production orientation and aided by the text "The Weight Men Carry" and its depiction of labor, gender, and social roles, translation tasks related to Chinese labor values and gender equality practices were introduced. Students were guided to compare differences in Chinese and Western labor narratives. When translating terms like craftsman spirit (gongjiang jingshen) and model worker spirit (laomo jingshen), training emphasized linking them to China's craft traditions, industrialization process, vocational education, and national honor systems. When narrating progress in gender equality, students were encouraged to cite achievements of women in fields like scientific research, aerospace, and rural revitalization to construct a developing, concrete narrative of Chinese gender equality.

Unit 6 (Global Issues and the Chinese Approach): Using explaining the concept and practice of China's ecological civilization construction as the production task, and starting from the text "The Coming Energy Crisis" and its discussion on global energy dilemmas, links were made to competition topics on China's ecological civilization construction and contribution to global climate governance. Students were guided to consider: How to explain the connotation and practices (such as photovoltaic poverty alleviation, river and lake chief system, and carbon market) of lucid waters and lush mountains are invaluable assets to an international audience? When translating dual carbon goals (shuangtan mubiao), how to clearly convey its strategic positioning, phased planning, and sectoral pathways? This required students to start from universal energy challenges and engage in contextualized interpretation and effectiveness demonstration of Chinese policies.

Through these integrations, translation competition tasks became persistent inquiry themes running through text learning, driving students to learn with clear application goals: to acquire linguistic tools and intercultural perspectives usable for analyzing, explaining, and defending Chinese practices. This enhanced learning motivation and a sense of real-world mission, making language learning directly serve the national strategic and personal development goals of enhancing international communication efficacy and promoting understanding.

3.3 The Facilitating Stage: Building Translation Competence through a Modular and Graded Training Chain

To effectively empower students to achieve the production targets set in the driving stage, this study, guided by the POA facilitating concept, systematically integrated and provided input for language, knowledge, and skills. It also designed a three-level progressive training chain consisting of micro-training, project task, and mock competition to offer structured support from comprehension to production.

(1) Modular Content Integration and Language-Knowledge-Skill Input

The Logic and Discourse Construction Module (Unit 1): Combined with the text "Love and Logic: The Story of a Fallacy", systematic input was provided on logical fallacy identification and analysis frameworks, supplemented by bilingual materials containing data and cases (such as excerpts from China Cultural Heritage Protection Reports). This helped students master how to use logical tools in translation to enhance argument persuasiveness and accuracy. The Cultural Identity and Aesthetic Interpretation Module (Unit 2): Centered on the text "The Misleading Perception of Beauty" and supplementary texts interpreting Chinese aesthetics, students were guided to deeply understand the philosophical connotations behind cultural terminology. Intercultural interpretation strategies were provided to enhance students' cultural narrative ability in translation. The Social Issues and Global Responsibility Module (Units 5 & 6): Based on the text "The Weight Men Carry", "The Coming Energy Crisis", and related policy texts, systematic input was provided on materials such as comparisons of Chinese and foreign labor perspectives and examples of ecological civilization construction. Students were trained to integrate expression across three levels: fact, policy, and value, strengthening their information organization and intercultural adaptation abilities in translation.

(2) Design and Implementation of a Three-Stage Progressive Training Chain

Classroom Micro-training: Short, timed translation exercises focused on key words and phrases from each module (such as high-quality development and cultural confidence) were conducted to reinforce linguistic accuracy and immediate response ability. Unit Project Task: After each module, students completed a comprehensive production task, such as writing an external publicity draft for Lingnan cultural heritage or a commentary on China's ecological civilization practices, accompanied by a translation strategy explanation, to promote knowledge internalization and integrated application. Mock Competition: At the end of the semester, a mock written translation or short video subtitle translation competition, aligned with the question types of the FLTRP·Guocai Cup, was held. This helped students transition

smoothly from classroom learning to competition practice, testing and enhancing their comprehensive application ability.

3.4 The Evaluating Stage: Implementing a Dual-Track, Multi-Faceted Feedback Mechanism with a Process-Result Orientation

This model adopted a dual-track evaluation system combining classroom formative assessment and competition summative assessment to comprehensively examine and promote students' translation competence development.
Classroom formative assessment ran throughout the teaching process, encompassing structured peer review, teachers' immediate targeted feedback on micro-training outputs, and annotated feedback on project assignments. The evaluation focus extended beyond linguistic accuracy to include logical coherence, thematic interpretation depth, and cultural appropriateness. Competition summative assessment used the competition grading criteria as an external reference, introducing core evaluation dimensions of thematic accuracy, linguistic appropriateness, and communication effectiveness. Students were encouraged to actively optimize their translations using the intercultural perspectives learned from the texts, aiming to enhance their acceptability and communication effect among international audiences.

3.5 The Transforming Stage: Promoting the Value Extension of Learning Outcomes towards Socialized Communication

To achieve the ultimate goal of "learning-using integration," this model systematically planned multi-dimensional pathways for transforming learning outcomes, promoting the leap of translation competence from classroom exercises to authentic communication practice. Building a Teaching-Derived Resource corpus: Outstanding student translations of text themes, competition translations, and explanatory texts were systematically archived to construct a bilingual teaching case library or corpus on the theme of general texts followed by contemporary China, uploaded to the teaching platform to feed into subsequent teaching. Organizing Multi-Level Outcome Showcases: Students' translations integrating text knowledge and competition themes were publicly displayed through online and offline platforms such as class interaction groups, English corners, and the teaching platform, fostering a positive application atmosphere. Expanding Real Communication Practice Fields: Under teacher guidance, students were encouraged to adapt textual works into short videos or graphic posts suitable for social media release, conducting safe, regulated "micro-communication" attempts. This allowed them to test and optimize their translation outputs in near-authentic international communication scenarios, ultimately completing the role experience from "classroom learner" to "cultural communicator."

4 PRACTICAL EFFECTIVENESS, CHALLENGES, AND REFLECTION

Through a 12-week teaching practice and systematic evaluation, this model demonstrated significant effectiveness in College English teaching for non-English majors, while also revealing several challenges for improvement.

4.1 Dual Enhancement of Translation Competence and Thematic Cognition

Research data indicates that students exhibited a significant shift in their translation of China-specific content, moving from a focus on linguistic form to an emphasis on meaning construction and intercultural adaptation. Results from translation tests showed that the accuracy rate for translating core terminology reflecting contemporary Chinese development concepts increased from a baseline of approximately 46% to 83%. More importantly, over 65% of students proactively adopted an intercultural compensation strategy of "paraphrasing followed by exemplification" when translating culturally rich Chinese philosophical expressions, demonstrating initial awareness of contextual supplementation and meaning negotiation. The thematic cognition survey further confirmed: through project-based learning, over 90% of students developed a more systematic and structured framework for understanding the China-specific discourse system, laying the groundwork for their role transition from "language learners" to "cultural communicators."

4.2 Initial Formation of Intercultural Communication Awareness

Students' audience awareness and intercultural adaptation ability significantly increased. The proportion of students who actively considered international readers' needs in their translations rose from about 25% to 72%. Approximately 65% of teams autonomously added visual elements in their project presentations to enhance communication effectiveness. Student reflections indicated that their focus had expanded from linguistic correctness to communication effectiveness and intercultural acceptability, with their role perception shifting from "information receiver" towards "cultural communicator."

4.3 Synergistic Effect of Teaching and Competition

This model constructed a virtuous cycle of classroom learning, competition practice, and teaching optimization. The experimental classes showed significantly increased enthusiasm for competition participation, with project works

performing well in both thematic accuracy and communication clarity. Teachers dynamically adjusted teaching emphases based on competition feedback, making guidance more targeted. The classroom ecology improved synchronously, with student active participation increasing by approximately 40%, and over 85% of students agreeing that competition-based learning was "more goal-oriented and rewarding." The translation competition played a dual role as catalyst and calibrator in this process, effectively activating learning motivation and optimizing teaching content. This study's practice preliminarily verifies the feasibility and promotional value of the competition-driven, learning-using integrated teaching pathway in College English courses for non-English majors.

Notwithstanding the model's positive outcomes, this study reveals several limitations in practice and design that warrant further attention. First, the current evaluation system still prioritizes linguistic form over the cultivation of discourse conversion and intercultural communication competence. Future assessment frameworks should integrate the translation of China specific themes and project or competition based performance as core components to establish a more holistic competency oriented system. Second, the communicative effectiveness and feedback mechanisms for student translations remain underdeveloped, lacking validation in authentic international contexts. Lightweight overseas feedback channels and guided microcommunication initiatives could provide students with structured cross cultural engagement. Third, the scope of the study is inherently limited by the size of the sample. As a preliminary exploration involving only two classes, the findings and applicability of the model require further verification through larger-scale, more diverse implementations to ensure broader generalizability.

5 CONCLUSION

This study took the translation competition "FLTRP·Guocai Cup: Understanding Contemporary China" as its core driver and POA as its theoretical framework to construct and implement a College English teaching model for non-English majors. Through a teaching chain involving thematic module reconstruction, competition task embedding, and outcome transformation and dissemination, it effectively addressed the dual dilemmas of insufficient Chinese thematic content and inadequate international expression in traditional instruction. Practice demonstrates that this model significantly enhances students' applied ability, cognitive level, and initial communication awareness in using English to explain Chinese issues, and has preliminarily achieved a positive interaction of "promoting learning through competition and promoting application through learning.

To further advance the pedagogical integration explored in this study, several directions for future research and practice are proposed. First, deepen the synergy among teaching, competition, and communication by designing more coherent project tasks to enhance students' comprehensive narrative ability. Second, rationally utilize technological tools, such as introducing AI-assisted translation and comparative training, to improve efficiency and quality in handling authentic texts. Third, expand cross-campus cooperation by establishing connections with relevant courses at domestic and foreign universities, building platforms for student work exchange and joint practice, and jointly exploring feasible pathways for cultivating a new generation of young foreign language talents who "cherish their homeland and communicate with the world."

COMPETING INTERESTS

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APPLICATION OF A PAD CLASS INTEGRATED WITH CBL TEACHING MODEL IN CULTIVATING TCM CLINICAL THINKING IN CHINESE MATERIA MEDICA

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Abstract: This study tackles the challenge of cultivating clinical thinking in *Chinese Materia Medica* education by integrating the Presentation-Assimilation-Discussion (PAD) Class model with Case-Based Learning (CBL). A teaching framework was structured around the "Lecture–Self-study–Reflection–Discussion–Evaluation" pathway, incorporating CBL cases distinguished by their typicality, authenticity, progressive complexity, and heuristic value. The alternating-class PAD approach was implemented to strengthen students' capacity to connect TCM theory, diagnosis, formulation, and herb application in clinical reasoning. A multifaceted evaluation system integrating process and outcome assessments was established, complemented by a TCM teaching clinic as a secondary learning platform to bridge theoretical knowledge and practical application. The model significantly enhanced student engagement and proficiency in syndrome differentiation and treatment. Future initiatives will prioritize the optimization of case libraries, advancement of teacher training, and exploration of AI-supported personalized learning pathways to inform innovative reforms in TCM curriculum design.
Keywords: TCM clinical thinking; PAD class; Case-Based Learning (CBL); *Chinese Materia Medica* instruction; Instructional reform

1 INTRODUCTION

Higher education in Traditional Chinese Medicine (TCM) carries the critical mission of cultivating professionals with solid theoretical foundations and exceptional clinical competence. As a cornerstone of the TCM curriculum, the *Chinese Materia Medica* course plays a pivotal role in shaping students' understanding of herbal properties, therapeutic efficacy, and clinical application. However, traditional instructor-centered teaching methods often prove inadequate in guiding students to apply abstract pharmacological theories to complex clinical scenarios, resulting in significant gaps in clinical thinking [1].

In response to this challenge, medical education has been shifting towards student-centered approaches that emphasize active learning, clinical reasoning, and problem-solving skills [2]. The Presentation-Assimilation-Discussion (PAD) class model facilitates systematic knowledge acquisition through its structured phases of concise lecturing, self-directed assimilation, and interactive discussion [3]. Complementarily, Case-Based Learning (CBL) employs authentic clinical scenarios to deepen analytical and decision-making abilities [4]. The integration of these two pedagogical strategies presents a promising approach to overcoming the limitations of conventional *Chinese Materia Medica* instruction by bridging knowledge delivery with cognitive development.

This study, therefore, focuses on the integration of the PAD class model and CBL within *Chinese Materia Medica* education. Through a systematic design encompassing case development, classroom implementation, and evaluative feedback, the research aims to enhance students' ability to apply knowledge and strengthen their dialectical thinking in clinical practice.

2 CURRENT STATE OF TCM CLINICAL THINKING CULTIVATION

TCM clinical thinking is a unique cognitive model shaped by China's distinctive cultural context and ancient philosophical traditions. It permeates the entire process of TCM theory construction, clinical syndrome differentiation, and treatment [5]. Its cultivation is rooted in the clinical practice sequence of "four diagnostic methods-syndrome differentiation-treatment determination-therapy implementation" [6]. This process encompasses key steps such as collecting diagnostic information, analyzing pathogenesis, and formulating treatment plans based on pattern differentiation. This cognitive process is essential for translating theoretical knowledge into practical clinical competence among TCM practitioners. However, a significant theory-practice gap persists in current *Chinese Materia Medica* education, which hinders students' ability to apply knowledge effectively [7].

Key challenges include a limited ability to identify core symptoms, which frequently results in unsystematic clinical analysis. A common difficulty is the failure to grasp both the primary symptoms and the underlying pathogenesis during syndrome differentiation. Even when familiar with herbal properties and functions, students often struggle to accurately match herbs to specific syndromes. This reveals a weak integration of TCM theory, diagnostic methods, formula design,

and herb application. These difficulties originate from a lack of systematic curriculum integration, leading to fragmented knowledge that impedes the development of applied clinical thinking. Furthermore, teaching and assessment mechanisms in *Chinese Materia Medica* courses often remain misaligned with the goal of cultivating clinical thinking. The prevailing evaluation system overemphasizes the memorization of herbal properties, while neglecting the effective assessment of syndrome differentiation skills and clinical reasoning. This misalignment diminishes the emphasis that both instructors and students place on clinical thinking skills.

3 IMPLEMENTATION OF THE INTEGRATED PAD CLASS AND CBL TEACHING MODEL IN INSTRUCTION

As a university-level flagship course at Jining Medical University, the *Chinese Materia Medica* curriculum has been continuously refined by the teaching team to stimulate and enhance students' clinical thinking in Traditional Chinese Medicine (TCM). Building on prior educational reforms, including mind mapping training and the implementation of the Presentation-Assimilation-Discussion (PAD) Class model [8-9], this study integrates the PAD Class with Case-Based Learning (CBL) to establish an innovative teaching model. The primary objective of this model is to systematically strengthen students' dialectical thinking and clinical practice skills.The PAD Class structures instructional time into three distinct phases: teacher presentation, student assimilation, and group discussion, thereby emphasizing active participation and independent thinking. Conversely, CBL employs authentic clinical cases as a foundational vehicle to guide students in analyzing and resolving practical problems, thereby fostering applied competence and critical reasoning skills. Integrating these two pedagogical strategies creates a synergistic model that leverages their respective strengths, ultimately aiming to improve overall teaching effectiveness.

3.1 Development of CBL Cases Based on TCM Clinical Thinking

High-quality cases are fundamental to the successful implementation of Case-Based Learning (CBL), and their design must be closely aligned with the core objective of cultivating clinical thinking in Traditional Chinese Medicine (TCM) [10]. The development of these cases should adhere to several key principles: typicality, authenticity, progressive complexity, and heuristic value [11].

A typical case should illustrate common clinical patterns or core herbal applications, allowing students to master fundamental principles of diagnosis and treatment through specific examples. For instance, a case involving a wind-cold common cold treated with Ephedra Decoction(Mahuang Tang) should clearly delineate Ephedra's medicinal properties, compatibility rules, and clinical precautions, emphasizing its acrid-warm nature and exterior-releasing function while stating contraindications explicitly. The principle of authenticity necessitates that case materials are derived from real clinical records or proven cases of experienced TCM practitioners, ensuring credible diagnostic scenarios, information from the four diagnostic methods, and treatment processes without fictionalization. Progressive complexity requires a structured design that advances from simple to complex, beginning with single syndrome patterns and core herb-pair analysis, then gradually introducing complex pathogenesis and differential diagnosis of similar syndromes to align with students' cognitive development. Finally, heuristic value emphasizes the incorporation of explorable questions, such as unexpected therapeutic outcomes, to stimulate critical thinking and encourage reflection on diagnostic accuracy, the rationale for herb selection, and dosage logic, thereby fostering clinical decision-making and reflective skills.

Cases should follow a structured framework: Case Summary-Syndrome Differentiation Analysis- Herb Selection Decision-Discussion Points [12]. The Case Summary provides essential information obtained through the four diagnostic methods (e.g., patient details, chief complaint, current symptoms, tongue, and pulse characteristics), presented concisely to facilitate preliminary syndrome differentiation. Syndrome Differentiation Analysis guides students in extracting core pathogenesis from clinical symptoms using TCM theory to establish a pattern diagnosis. As the core step, Herb Selection Decision requires students to prescribe key herbs based on the diagnosis, considering the herbs' properties, efficacy, channel tropism, and compatibility contraindications, while justifying their selections. Discussion Points, pre-designed by the instructor, may focus on herb-syndrome correspondence, comparisons of similar herbs, potential risks, or comparisons with classic medical cases to steer discussions toward achieving the learning objectives.

3.2 Organic Integration of PAD Class and CBL: An Instructional Pathway of "Lecture–Assimilation–Reflection–Discussion–Evaluation"

The efficacy of integrating the Presentation-Assimilation-Discussion (PAD) class model with Case-Based Learning (CBL) hinges on a coherent instructional design and its consistent implementation [13]. This study operationalized an instructional process structured around "teacher's concise lecture, student assimilation and reflection, case discussion, and summary evaluation." Specifically, an alternating-class PAD format was adopted, wherein the complete learning cycle spanned two consecutive class sessions to ensure adequate time for knowledge internalization.

3.2.1 Teacher's concise lecture
During the first session of the two-class cycle, the instructor delivers a concise lecture limited to approximately 20 minutes, focusing on core concepts such as the classification, properties, channel tropism, and fundamental efficacy of exterior-releasing medicinals. The primary objective is to establish a foundational knowledge framework while elucidating key concepts and clarifying common points of confusion, deliberately avoiding comprehensive coverage.

Subsequently, clearly defined self-directed learning and case analysis tasks are assigned to guide the subsequent learning phase.

3.2.2 Student self-directed learning and group discussion

Following the teacher's concise lecture in the first session, students engage in self-directed learning during the remaining in-class time and after class. This involves utilizing the Chaoxing platform to access resources such as instructional videos and excerpts of clinical experiences from renowned practitioners. Working in small groups, they conduct preliminary discussions on the assigned CBL cases and complete individual PAD (Presentation-Assimilation-Discussion) assignments. To prepare for subsequent in-depth classroom discussions, students are required to complete consolidation tests on the platform within a stipulated timeframe and submit a written summary of their preliminary case analysis. This summary must include the key points of syndrome differentiation and the rationale for herb selection .

3.2.3 In-depth CBL case discussion

In the second class, 15 minutes are allocated for detailed CBL case discussions in groups of 5–7. The teacher begins by reiterating the core questions and objectives. Each group analyzes issues such as "how to select exterior-releasing medicinals for a patient with wind-cold exterior syndrome and internal dampness obstruction," engaging in advanced syndrome differentiation and treatment decision-making. A group leader facilitates discussions while a recorder organizes key points. The instructor circulates to guide reasoning through questioning, offering timely hints without providing direct answers. Finally, representatives from each group present their analytical processes and conclusions .

3.2.4 Summary and evaluation

The teacher concludes with a systematic review of the case discussions, summarizing core knowledge points and addressing common questions. Using the case as an example, the teacher explicates how the principle of "identifying pathogenesis through syndrome differentiation and determining treatment based on pathogenesis" guides herb selection. The entire learning activity is evaluated, and feedback is provided based on formative assessment records (Figure 1).
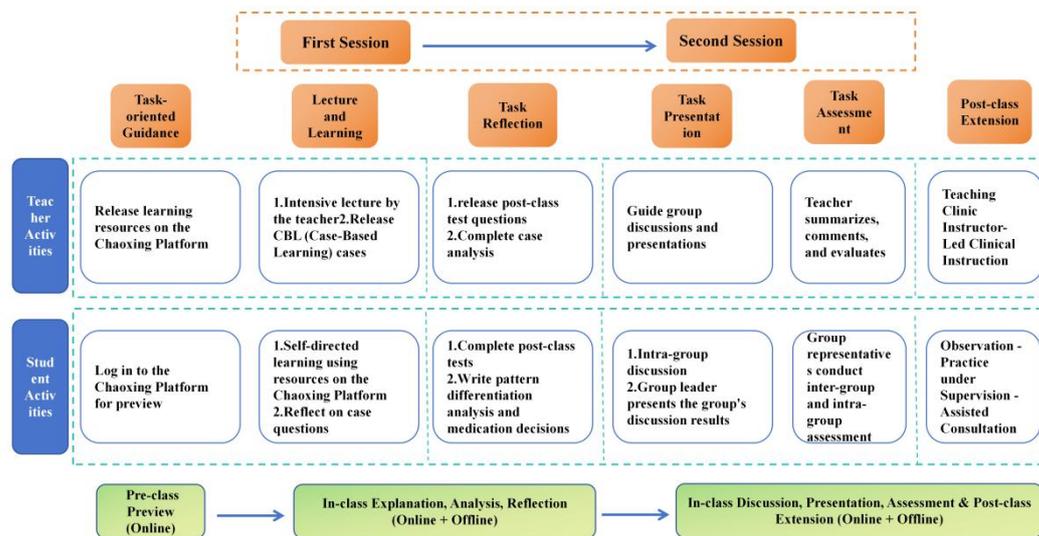

Figure 1 Pathway of Integrated PAD Class and CBL Instructional Practice

3.3 Development of an Integrated Process and Outcome Teaching Evaluation System

Teaching evaluation is a critical component for measuring instructional effectiveness, providing feedback on pedagogical issues, and guiding educational reform. To address the limitations of traditional models—which overrely on final examinations and fail to dynamically capture the development of students' clinical thinking and practical abilities—this study established a dual-dimensional evaluation system integrating process and outcome assessment.

In process-oriented assessment, the emphasis shifts from rote memorization of discrete facts to evaluating higher-order competencies, including TCM clinical thinking, teamwork, and logical expression. The operational approach incorporates two key elements: first, the use of a structured classroom observation scale to record and score critical behaviors during case discussions, such as the logical coherence of syndrome differentiation, the analytical depth in assessing herb-syndrome correspondence, and the effectiveness of responses to challenges [14]; and second, the implementation of a multi-source evaluation mechanism during group presentations, which involves both instructors and student representatives to assess the internal logic of prescription decisions, the appropriateness of herb selection, and the accuracy of professional expression [15]. This integrated approach ensures that evaluation results more accurately reflect students' comprehensive literacy and developmental potential.

In outcome-oriented assessment, periodic quizzes and final examinations remain the primary forms of evaluation, but their emphasis shifts from the recall of discrete facts to assessing comprehension and applied skills. Specifically, this involves increasing the proportional weight of subjective questions grounded in case analysis. Furthermore, simulated

clinical tasks are designed to require students to independently execute a complete clinical thinking process. This process begins with collecting diagnostic data through the four examinations, continues with conducting syndrome differentiation, and culminates in establishing treatment principles and selecting appropriate formulas and herbs. This approach provides a comprehensive evaluation of students' ability to translate theoretical knowledge of *Chinese Materia Medica* into clinical practice.

By constructing this multidimensional evaluation system, teaching assessment no longer serves merely as a scoring tool but becomes a supportive mechanism for continuously fostering student development, ultimately advancing the goal of cultivating TCM clinical thinking and professional competence.

4 EMPHASIZING COMPLEMENTARY LEARNING PLATFORMS

While the integrated teaching model of PAD Class and CBL effectively trains students' abilities in syndrome differentiation analysis and medication decision-making within simulated scenarios, its activities remain confined to the classroom. To address the critical shortcoming of students lacking opportunities to fully temper their TCM thinking in real, complex, and dynamic clinical settings, we have introduced the TCM teaching clinic as an indispensable complementary learning platform.

Building upon the traditional master-apprentice education model, the TCM teaching clinic establishes a progressive instructional pathway of "observing the master in clinic - simulated patient diagnosis - collaborative assisted diagnosis" [16]. Within the teaching clinic, learning is student-centered. Students are required to independently complete the entire process—from patient reception and history-taking through the comprehensive application of the four diagnostic methods, to analyzing pathogenesis, performing syndrome differentiation, and ultimately prescribing medication. The instructor assumes the roles of guide and safety guarantor, whose primary responsibilities are to observe, guide, ensure medical safety, and provide immediate analysis, correction, and explanatory feedback after the student completes the consultation. This step-by-step clinical practice model, grounded in real patient cases, is a crucial link enabling students to transform knowledge acquired in the classroom into stable clinical thinking and proficiency in syndrome differentiation and treatment.

5 REFLECTIONS ON TEACHING PRACTICE

The teaching model integrating the PAD Class with CBL has demonstrated multifaceted impacts. Through clear pre-class self-directed learning and case analysis tasks, students' initiative is more effectively stimulated, leading to active participation in group discussions and in-depth exchanges on key points of syndrome differentiation and the rationale for herb selection. When analyzing medical cases, students are required to comprehensively apply knowledge of herbal properties, efficacy, and channel tropism, conducting integrated analyses based on clinical manifestations. This effectively facilitates the transition of students' knowledge of *Chinese Materia Medica* from rote memorization to flexible application, thereby enhancing their clinical practical ability. The model's subtle cultivation of students'TCM clinical thinking is particularly important. By analyzing cases, students gradually master the complete process of syndrome differentiation and treatment—from collecting information through the four diagnostic methods and analyzing pathogenesis to determining treatment principles and selecting/formulating prescriptions—forming a thinking pattern centered on "formula–syndrome–pathogenesis–herb," which enables them to preliminarily develop the ability to prescribe medicines based on syndrome differentiation .

The successful implementation of this model places higher demands on the transformation and capabilities of the teacher's role. Teachers are required to shift from being mere knowledge transmitters to becoming guides and organizers of the learning process. Effectively managing discussion pacing in class, prompting deep thinking through key questions, and providing timely guidance without excessive intervention all pose greater challenges to teachers' abilities. The adaptability differences among student groups cannot be ignored. Students with weaker foundational knowledge or those accustomed to passive learning may struggle in case discussions, leading to low participation, which could potentially result in a polarization of learning outcomes over time. Designing more tiered cases and providing personalized learning support are urgent challenges to address. With the rapid development of AI technology, precise construction of personalized learning profiles through AI-based monitoring of learning conditions, integrating data from unit tests and case analyses, allows teachers to push targeted reinforcement tasks to students based on AI-analyzed learning data, enabling precise teaching intervention. This may represent an important direction for deepening teaching reform.

6 CONCLUSION

The integration of the PAD Class and CBL, through its structured classroom design of "concise lecture, assimilation, and discussion" and the organic incorporation of authentic cases, effectively stimulates students' learning initiative and enhances both their depth of understanding of *Chinese Materia Medica* knowledge and their clinical application abilities. Through the case analysis process, students gradually construct TCM clinical thinking centered on syndrome differentiation and treatment, thereby addressing the deficiencies of traditional teaching methods in cultivating cognitive skills .

To continuously improve teaching effectiveness, future efforts should focus on key areas such as case library development, enhancement of teacher and student capabilities, and optimization of evaluation mechanisms. Specific

tasks include establishing a hierarchical and comprehensive case resource system, implementing specialized training to improve teachers' instructional facilitation skills, and refining a multifaceted evaluation scheme that integrates process and developmental assessments to promote the model's routine and efficient operation. The further development of teaching clinics should be actively promoted, positioning them as a bridge connecting the classroom with clinical practice. Additionally, introducing digital technologies to integrate real outpatient cases and build a reusable, traceable digital case library can significantly supplement classroom case resources, providing students with readily accessible materials for extended learning.

The integrated PAD Class and CBL teaching model offers a promising practical pathway for reforming *Chinese Materia Medica* instruction. Its successful experience also holds reference value and potential for adoption in teaching innovations within other TCM-related courses.

COMPETING INTERESTS

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APPLICATION RESEARCH OF BOPPPS TEACHING MODEL BASED ON OBE CONCEPT SPOC PLATFORM IN HIGHER VOCATIONAL EDUCATION: A CASE STUDY OF INTERNAL MEDICINE NURSING COURSE

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Abstract: Objective: To investigate the implementation of a hybrid teaching model—integrating the BOPPPS framework within a SPOC platform under the guidance of the OBE concept—in internal medicine nursing courses at higher vocational colleges. Methods: The 2022 and 2023 higher vocational nursing students (here in after referred to as nursing students) from a university in Baise City, Guangxi were selected by cluster sampling method as the research subjects. The intervention group (n=236 implemented hybrid teaching based on the BOPPPS teaching model with the help of the SPOC platform, and the control group (n=216) adopted conventional teaching methods. The autonomous learning ability, critical thinking and test scores of the two groups of nursing students were compared. Results: The autonomous learning ability, critical thinking and test scores of the nursing students in the experimental group were higher than those in the control group (P<0. 05). Conclusion: The hybrid teaching based on the BOPPPS teaching model under the SPOC platform based on the OBE concept has a positive effect on improving the autonomous learning ability, critical thinking ability and test scores of nursing students.
Keywords: OBE; BOPPPS; SPOC; Internal medicine nursing; Higher vocational colleges

1 INTRODUCTION

Integral to China's workforce development strategy, higher vocational education cultivates practice-oriented professionals for frontline sectors [1]. Central authorities mandate pedagogical innovation, including technology-integrated active learning—to develop socioeconomically aligned technical talent [2]. The China Education Modernization 2035 blueprint further prioritizes heuristic and collaborative pedagogies to enhance clinical problem-solving capabilities, coupled with faculty digital upskilling [3]. This policy framework establishes student-centered, employment-driven training of operationally competent practitioners.

As a core nursing course in higher vocational education, Internal Medicine Nursing constitutes 30%-40% of the professional curriculum by instructional hours and nursing licensure examination content. Its extensive scope and high cognitive complexity contrast sharply with prevailing didactic approaches reliant on passive multimedia delivery and large-class lectures. Current pedagogical limitations include: (1) Inadequate learning monitoring: Delayed feedback impedes personalized instruction; (2) Deficient learner engagement: Weak professional identity and self-directed motivation; (3) Critical skill gaps: Underdeveloped clinical reasoning, communication, and praxis translation—evidenced by theory-practice disconnects in case management. In the digital education era, this outdated model failed to meet national competency benchmarks. An urgent paradigm shift toward pedagogically structured, technology-enhanced teaching is imperative.

Proposed by Spady (1981), outcome-based education (OBE) centers on measurable competencies as the endpoint of curriculum design and delivery [4]. This learner-centered paradigm—alternatively termed competency-, goal-, or demand-driven education—has demonstrated efficacy in engineering pedagogy, online instruction, and general education reform [5]. Its core principles shift focus from content coverage to attainment validation, enhancing learner engagement, knowledge internalization, and clinical decision-making confidence. This empirical foundation positions OBE as a viable framework for optimizing medical education design. Small Private Online Courses (SPOC) leverage massive open online courses (MOOC) infrastructure to deliver targeted instruction for specialized cohorts, characterized by a three-phase pedagogical architecture: (1) Asynchronous video engagement where learners identify clinical reasoning challenges; (2) Instructor-facilitated discussions scaffolding preview-derived queries; and (3) Dynamic deployment of digital resources aligned with curricular objectives and learner needs [6-7]. This blended model demonstrates enhanced knowledge retention and diagnostic skill refinement, establishing SPOC as an evidence-based modality for medical education innovation.

The Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment, Summary (BOPPPS) teaching model originates from the Instructional Skills Workshop International Training Program (ISW-ITP), a faculty development system accredited by Originating from Canada's British Columbia Campus (BC campus), the BOPPPS model operationalizes student-centered pedagogy through six sequenced phases: Bridge-in (engagement stimulus), Objective (competency targets), Pre-assessment (baseline diagnostics), Participatory learning (active construction), post-assessment (outcome validation), and Summary (metacognitive consolidation) [8-9]. Empirical studies

demonstrate that strategic Bridge-in design elevates classroom engagement, while full-cycle implementation optimizes instructional scaffolding and knowledge retention [8-9]. Crucially, integrated Pre-/Post-assessment enables real-time learning analytics, permitting precision knowledge delivery and adaptive intervention, particularly vital for clinical reasoning development in nursing education. These evidence-based advantages establish BOPPPS as a methodologically robust framework for this investigation.

The OBE-anchored BOPPPS-SPOC integrated framework constitutes an evidence-based blended learning model, characterized by competency-driven design, multimodal resource curation, and real-time outcome analytics. This approach operates through three scaffolded phases: (1) Pre-class deployment of clinical simulations aligned with core competencies; (2) In-class facilitation of case-based peer critiques with deliberate practice scaffolding; and (3) post-class remediation using predictive analytics to close individual competency gaps. In this study, we implement this outcome-engineered model in Internal Medicine Nursing education, measuring clinical judgment maturation (Clinical Judgment Rubric) to advance precision nursing education.

2 METHOD

2.1 Study Population

A prospective, non-randomized cluster-controlled trial with parallel cohorts was conducted, adhering to the TREND statement for non-randomized interventions [10]. Cluster sampling was performed at a tertiary vocational medical college in Central China between September 2024 and January 2025 after obtaining informed consent. This resulted in two cohorts: 2022-level nursing students forming the Control group (n = 216) and 2023-level nursing students forming the Intervention group (n = 236). Participants were included if they met all the following criteria: (1) enrollment in a 3-year vocational nursing program, (2) completion of prerequisite courses (Human Anatomy, Pathophysiology, Biochemistry, Nursing Psychology, Health Assessment), and (3) first-time enrollment in the Internal Medicine Nursing course during their second academic year. Participants were excluded based on: (1) discontinuation due to medical leave exceeding 4 consecutive weeks, or (2) absenteeism exceeding 20% of scheduled sessions. There was no statistically significant difference in age and gender between the two groups of patients (P=0.984 and P=0.097, respectively).

2.2 Textbooks and Teaching Content

Both the control and experimental groups undertook the Internal Medicine Nursing course during the first semester of their second year. The textbook used was the 1st edition of Internal Medicine Nursing, edited by Wang Xinying and Wang Suorong and published by People's Medical Publishing House (PMPH). Identical teaching faculty and course syllabi were employed for both groups, with all theoretical and practical instruction delivered by the same full-time faculty members. The unit on "Nursing Care for Cerebrovascular Diseases" (totaling 3 credit hours) within this course was selected as the specific teaching content exemplar for this study.

2.3 Teaching Methods

2.3.1 Control group

The control group adopted the traditional classroom teaching method; the course is taught according to the conventional teaching method. The specific process is: first, teachers and students review the key points of the previous lesson together, introduce the new lesson through cases, and the teacher teaches according to the requirements of the syllabus. Finally, the key points of this lesson are summarized, and homework is assigned.

2.4.1 Intervention group

The intervention group adopted the BOPPPS hybrid teaching model based on the OBE concept under the SPOC platform. The detailed step is as follows:

(1) Pre-class: According to the curriculum standards, teaching objectives are set up, and online learning and communication platforms (QQ groups, WeChat groups, etc.) are established. One week before class, teachers publish learning task sheets, micro-classes, PPTs, animations, teaching cases, and post-preview test questions for course knowledge modules on the online MOOC platform and arrange pre-class tasks through the online learning and communication platform. Students complete pre-class learning as required (reading tasks, self-learning of pre-class knowledge, completing pre-class exercises, and marking learning confusions). Questions, confusions, and difficult-to-understand knowledge points in the pre-class are sent to the lecturer through the QQ group and WeChat group. The teacher prepares the teaching content based on the students' pre-class feedback and common problems.

(2) In-class: Phase 1: Course introduction. After students have completed pre-study, they will be introduced to the course in the online MOOC discussion area. The instructor will post cases, knowledge expansion links, social focus, thinking questions, and animations related to the teaching knowledge module in the discussion area to stimulate students' curiosity through discussion. → Phase 2: Goals. According to the teaching standards of the "Internal Medicine Nursing" professional course and the typical job task requirements of the position, the teaching objectives are determined, and they are uploaded to the MOOC one week before the class, so that students can complete the pre-study tasks with the teaching objectives. → Phase 3: Pre-test. The teacher will post the pre-class test questions on Rain classroom 2 days before the class. One day before the class, the teacher will analyze the test results to understand and judge the students' knowledge and ability weaknesses and adjust the content and objectives of the classroom teaching

accordingly. → Phase 4: Participatory learning. Based on the teaching objectives and job requirements, the teacher will determine the key points and difficulties of classroom teaching in combination with the pre-test results. In the classroom teaching, different teaching methods (student group discussion, scenario simulation, role-playing, etc.) are used according to different knowledge points, and the content of internal medicine nursing skills is organically integrated in a timely manner. →Phase 5: Post-test. Teachers set post-test questions based on the course teaching objectives, job competency requirements (including clinical practice ability training), teaching difficulties, and students, problems before and during class, and use a high-simulation electronic manikin system for assessment. →Phase 6: Summary. Summarize the teaching effect of the knowledge module of this course, analyze the problems and deficiencies of students in basic knowledge learning and application, professional skills mastery, and professional ability development, and propose solutions and suggestions for the problems. Finally, test questions are issued for common problems to check for omissions and further consolidate knowledge.

(3) Post-class: The person in charge of the "Internal Medicine Nursing" course organized all the teaching staff to conduct a discussion and summary, completing the process discussion and summary (students' online learning participation, pre-class preparation results, students' classroom teaching participation, group discussion and exchange activities participation, etc.), and the result discussion and summary (students' regular and final theoretical and practical examination scores, student questionnaires and interview results, test papers, etc.) → Based on the characteristics of this course, put forward improvement suggestions and guide the next step of teaching.

The design of the specific teaching process is introduced using the nursing care of patients with cerebrovascular diseases as an example. The teaching design is shown in Table 1.

Table 1 Nursing Care for Patients with Cerebrovascular Diseases: BOPPPS Hybrid Teaching Design Based on OBE Concept SPOC Platform

Time	Contents
Pre-class	Rain classroom pushes "pre-class learning task list" to help students complete pre-class independent learning.
	1) Students go to the MOOC "Internal Medicine Nursing" knowledge map to learn cerebrovascular disease knowledge online according to the task list, and teachers supervise and feedback online.
	2) Assigned individual pre-class subjective homework. After completing the homework, students take photos and upload them. Pre-class homework only counts completion points, not right or wrong points.
	3) Assigned group pre-class tasks (report and present the discussion results in the form of PPT). To encourage group students to actively discuss and cooperate, every group member must participate, and each member must be assigned a task. The task topics include the following aspects:
	① What are the three major diseases that currently cause human death?
	② What are patients most worried about?
	③ What is our main task as medical workers?
	④ What are the upper limb spasticity patterns of hemiplegic patients?
	⑤ Why is the side-lying position beneficial to patient recovery?
	⑥ My opinion on the case of "White Strongman"?
	Episode 4: A taxi driver usually has a mild personality, but recently his temperament has changed drastically, and he is very irritable and irritable, causing a major traffic accident. After being admitted to the hospital for examination, it was found that it was caused by a brain tumor. Where is the brain tumor located? Why did it cause personality changes?
	Episode 10: A female patient was admitted to the hospital due to cerebral arteriovenous malformation. After arguing with others, she suddenly had a severe headache and vomited. What might be the reason?
	Episode 18: A worker was crushed by a heavy machine, resulting in severe cerebral hemorrhage. The doctor directly opened the skull without any medical equipment on site. Why did he take the risk to do so?
	4) The task list emphasizes that the understanding and mastery of cerebrovascular diseases is the prerequisite for further exploration of the course.
In-class	The course is carried out in the order of "pre-class introduction - knowledge point sorting - raising questions - group competition (discussion + mutual evaluation) - learning feedback".
	1) Pre-class test. The questions are 9 basic multiple-choice questions, multiple-choice questions and judgment questions to test students' pre-class learning effect.
	2) Introduction of cerebrovascular diseases. The course content is introduced through the introduction of photos of celebrities such as Stalin, Roosevelt, and Churchill, and three pre-class debate questions (① What are the three major diseases that currently cause human death? ② What are patients most worried about? ③ What is our most important task as medical workers?). When answering the three questions, each group went to the podium to report and display in the form of PPT. There were 4 groups in each class, and each group had a time limit of 3 minutes to report. Other groups scored.
	3) Knowledge point sorting. Focus on explaining the problems that occurred in the pre-class online test, personal homework, and pre-class test.
	4) Constantly throwing questions. To cultivate students' high-level thinking abilities such as problem solving and in-depth thinking, questions are thrown in class:
	① If someone around you suddenly speaks unclearly and has a crooked mouth, how would you judge whether he has a stroke? Use observation questions in life to introduce the knowledge of cerebrovascular diseases in this class.
	② Is cerebrovascular disease a stroke? Is stroke equivalent to cerebrovascular disease? Why do some people recover almost completely after a stroke, while others are left with serious functional impairments? What are the reasons behind this? What is the difference between ischemic and hemorrhagic strokes? Which is more dangerous? Introduce the definition and classification of cerebrovascular diseases so that students can better understand the definition and

classification of cerebrovascular diseases. The method of asking questions and on-site interaction is fascinating, so that students know the truth and the reason.

③ Why do high blood pressure and diabetes greatly increase the risk of stroke? Why does arteriosclerosis cause ischemic stroke? How do blood clots form and block cerebral blood vessels? Why does intracranial pressure increase after a hemorrhagic stroke? What are the hazards of increased intracranial pressure to brain function? Which organ is most likely to be damaged when hypoxia occurs? Introduce knowledge points such as cerebrovascular anatomy and risk factors.

④ When preparing to talk about the FAST principle, please demonstrate how the "FAST" principle can be used to determine stroke? And give several different patient symptoms, so that students can quickly determine whether it is an ischemic stroke or a hemorrhagic stroke?

⑤Suppose you are an emergency nurse and receive a patient suspected of stroke. How should you assist the doctor in making a preliminary diagnosis and treatment? Do you know what the "golden 4.5 hours" is? Why does the treatment of stroke emphasize time so much? Introduce knowledge points such as first aid measures.

⑥Why is the earlier the better for rehabilitation training after stroke? Is late rehabilitation still useful? Provoke students to think.

5) Group discussion, competition performance, and mutual evaluation. In order to encourage students to think and discuss, the "White Strongman" case and questions are pushed through Yu Classroom in the group competition performance. After independent thinking and peer discussion, the group students go on stage to make PPT reports. The group students discuss and summarize and share ideas, and the teacher makes supplementary summaries. The group evaluates and scores each other, and the teacher confirms the fairness of the scoring after class.

6) Feedback on learning this week. To encourage students to actively summarize, reflect and make suggestions, feedback in the form of subjective questions is set at the end of the class. Students respond to their self-study situation, satisfaction, learning confusion or suggestions in real time.

Post-class   1) Provide additional answers (text) based on students' classroom learning feedback.

2) Assign personal after-class homework within a limited time and score according to the correctness rate.

3) Assign personal optional after-class extension homework, including but not limited to drawing a mind map of cerebrovascular disease knowledge map, using simulated electronic people to conduct stroke treatment simulation drills, etc.

4) The cumulative public announcement of the group experience value of this class (before class + during class). Before class, the group performance accumulates experience value according to cooperative discussion and PPT completion, and the class accumulates experience value according to the group competition ranking.

5) Knowledge point hyperlink expansion, introduction to stroke treatment guidelines.

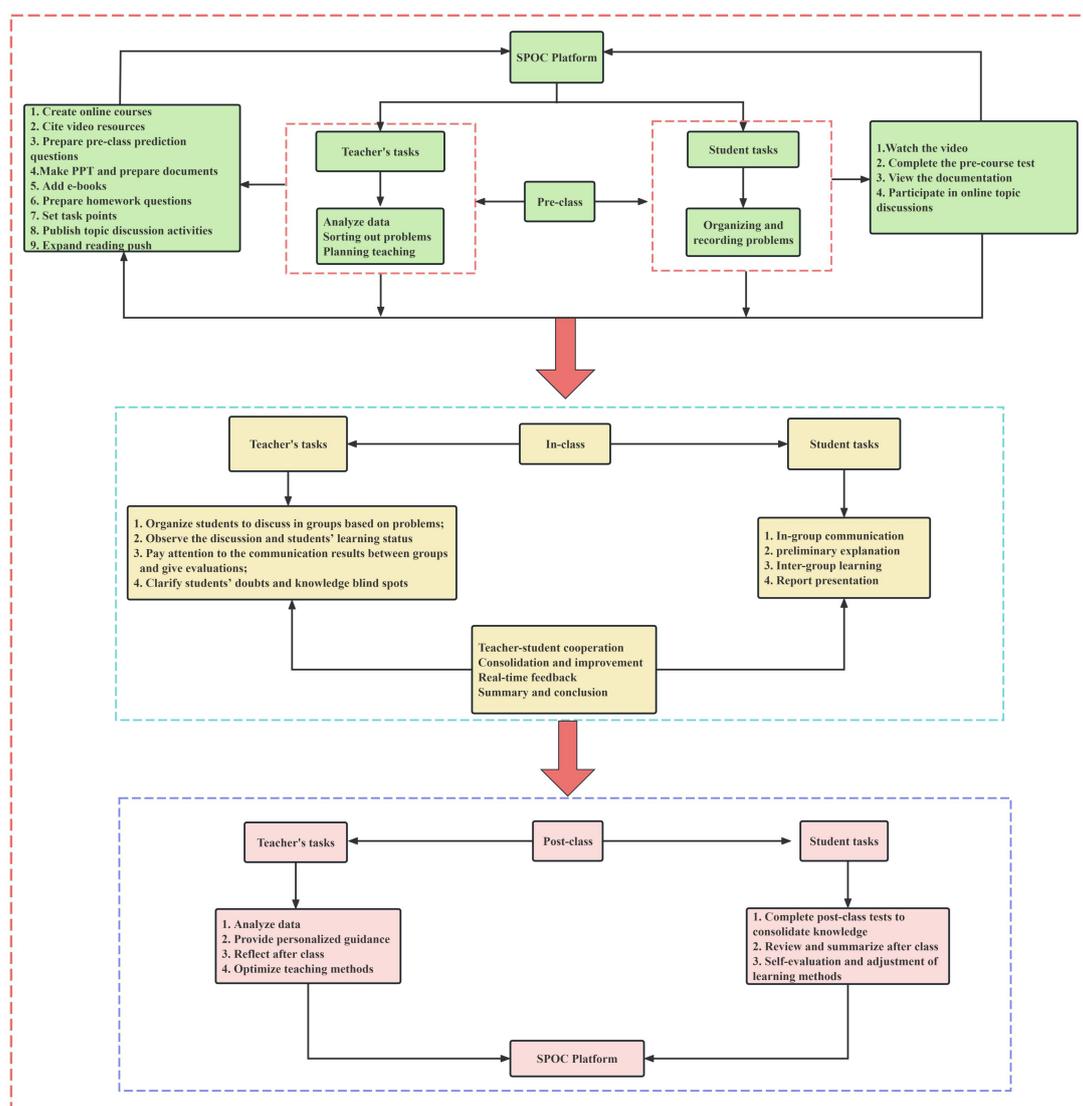The flow chart of the BOPPPS teaching model under the SPOC platform is shown in Figure 1:

Figure 1 The Flow Chart of the BOPPPS Teaching Model under the SPOC platform

2.5 Evaluation Indicators

2.5.1 Autonomous learning ability

The scale was compiled by Zhang Xiyan et al [11]. It includes 4 dimensions: learning motivation, self-management ability, cooperation ability, and information literacy. There are 30 items in total. The Likert 5-level scoring method is used. Full compliance is 5 points, and full non-compliance is 1 point. The reverse statement items include 10, 16, 20, 24, and 28 for reverse scoring. The total score is 30-150 points, including 8-40 points for learning motivation, 11-55 points for self-management ability, 5-25 points for cooperation ability, and 6-30 points for information literacy. The higher the score, the stronger the autonomous learning ability. The Cronbach's a of the scale is 0.82, and the Cronbach's α of each dimension is 0.77, 0.79, 0.86, and 0.74, respectively.

2.5.2 Clinical thinking ability scale

The clinical thinking ability scale compiled by Song Junyan [12] was used, which includes three dimensions: critical thinking (6 items), systematic thinking (11 items), and evidence-based thinking (7 items), with a total of 24 items. Each item uses the Likert 5-point scoring method, ranging from 1 to 5 points from "very poor ability" to "very good ability". The higher the score, the stronger the clinical thinking ability. Cronbach's α coefficient of the scale is 0.909, and the test-retest reliability is 0.839, with good reliability and validity.

2.5.3 Academic performance

The final examination scores of the two groups of nursing students were compared. The examination papers were set by the same lecturer to ensure that the examination knowledge points, and difficulty was consistent. Included objective structured clinical examination (OSCE) skill score (30%) and theoretical score (70%).

2.6 Statistical methods

All data analysis will be conducted using the STATA statistical software package, Release 17.0 (Stata Corp LLC, College Station, Texas, USA, 2019). The count data of the two groups were expressed as [n (%)], and the chi-square test was used for comparison between the two groups. The measurement data of the two groups were described by mean ±

standard deviation (x ± s), and the values between the two groups were compared using independent sample t-test, with P < 0.05 indicating statistically significant differences.

3 RESULT

3.1 Comparison of Autonomous Learning Ability Scores between Intervention and Control Groups

The intervention group (n = 236) had significantly higher scores than the control group (n = 216) in all dimensions of autonomous learning ability ($P < 0.001$): learning motivation (34.5±2.79 vs 26.1±4.95, t = 22.3), self-management ability (44.5±4.45 vs 31.7±5.82, t = 26.5), learning cooperation ability (20.9±2.38 vs 12.1±2.54, t = 37.8) and information literacy (23.0±2.76 vs 13.4±1.97, t =42.5), and the total score difference was the most significant (122.9±6.29 vs 83.3±8.00, t = 58.8) (See Table 1 for details) (Table 2).

Table 2 Comparison of Autonomous Learning Ability Scores of Two Groups of Higher Vocational Nursing Students (Mean±SD, Points)

Group	N	Learning motivation dimension	Self-management ability dimension	Learning cooperation ability dimension	Information literacy dimension	Autonomous learning ability total score
Intervention group	236	34.5 ± 2.79	44.5 ± 4.45	20.9 ± 2.38	23.0 ± 2.76	122.9 ± 6.29
Control group	216	26.1 ± 4.95	31.7 ± 5.82	12.1 ± 2.54	13.4 ± 1.97	83.3 ± 8.00
T value		22.3	26.5	37.8	42.5	58.8
P		<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

* P<0.001

3.2 Comparison of Critical Thinking Ability Scores between Intervention and Control Groups of Higher Vocational Nursing Students

The intervention group (n = 236) demonstrated significantly higher scores than controls (n = 216) in total critical thinking ability (22.3±1.65 vs 13.1±1.69, t = 58.3), system thinking ability (34.2±2.25 vs 22.7±2.28, t = 53.8), and evidence-based thinking ability (19.7±1.55 vs 13.2±1.78, t = 42.0), with all comparisons P < .001. The largest effect was observed for total critical thinking ability (t = 58.3) (Table 3).

Table 3 Comparison of Critical Thinking Ability Scores between the Two Groups of Higher Vocational Nursing Students (Mean±SD, Points)

Group	N	Total critical thinking ability score	Total score of system thinking ability	Total score of evidence-based thinking ability
Intervention group	236	22.3 ± 1.65	34.2 ± 2.25	19.7 ± 1.55
Control group	216	13.1 ± 1.69	22.7 ± 2.28	13.2 ± 1.78
T value		58.3	53.8	42.0
P		<0.001*	<0.001*	<0.001*

* P<0.001

3.3 Comparison of Written Test, OSCE Skills, and Total Scores between Intervention and Control Groups

The intervention group (n = 236) achieved significantly higher written test scores (86.9±9.52 vs 71.3±11.38, t = 15.82), OSCE skills scores (90.9±6.68 vs 87.1±6.66, t = 6.12), and total scores (88.1±7.12 vs 76.0±8.57, t=16.31) than controls (n = 216) (P < .001). The most substantial difference was observed in total scores (*t*=16.31), while OSCE skills showed the smallest effect size (t = 6.12) (Table 4).

Table 4 Examination Scores of Two Groups of Higher Vocational Nursing Students (Mean±SD, Points)

Group	N	Written Test Scores	OSCE Skills Scores	Total score
Intervention group	236	86.9 ± 9.52	90.9 ±6.68	88.1 ± 7.12
Control group	216	71.3 ± 11.38	87.1±6.66	76.0 ± 8.57
T value		15.82	6.12	16.31
P		<0.001*	<0.001*	<0.001*

* P<0.001

4 DISCUSSION

Against the backdrop of nursing discipline advancement and the escalating complexity of healthcare environments, cultivating nursing professionals equipped with lifelong learning capabilities, critical thinking, and a high degree of autonomous practice has emerged as a paramount objective in global nursing education [13-16]. In response to this imperative, the present study developed and implemented a structured blended teaching model by deeply integrating the OBE philosophy with a SPOC platform, structured around the BOPPPS framework. Application of this model in nursing education demonstrated that it not only effectively enhanced students' theoretical performance and practical skills but also significantly stimulated their capacity for self-directed learning.

4.1 The Hybrid Teaching of BOPPPS Teaching Mode Based on OBE Concept and SPOC Platform can Stimulate the Autonomous Learning Ability of Nursing Students

In contrast to the traditional teacher- and textbook-centered approach in nursing education, which often results in relatively passive student engagement, the blended teaching model developed in this study represents a core innovation through the organic integration of three key dimensions: the guiding philosophy of Outcome-Based Education (OBE), the systematic structure of the BOPPPS instructional framework, and the technological enablement of the SPOC platform. Together, these elements form an interlinked, continuously improving pedagogical system designed to empower learners. Specifically, the OBE approach adheres to a "backward design" principle, whereby clear, measurable, and professionally relevant competency outcomes—such as "independently developing an evidence-based health education plan for patients with cerebrovascular disease"—are communicated to students from the very beginning of the course [17-18]. This establishes a definitive "navigational beacon" for self-directed learning, shifting students' perspective from passively completing coursework to actively pursuing competency attainment [19-20]. This internalized sense of purpose becomes a intrinsic driver for planning their learning, seeking resources, and evaluating progress. The BOPPPS structure, through its six-phase cycle (Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment, Summary), creates a coherent instructional loop aligned with cognitive principles, serving as a scaffold for autonomous learning [21]. It begins by sparking interest through clinically authentic scenarios, moves to self-diagnosis via pre-assessment, engages students in active thinking and collaboration through participatory methods such as case discussions and simulations, and concludes with post-assessment and summary to foster reflection and feedback. This structured process guides students through a continuous cycle of "anticipation, exploration, verification, and reflection," equipping them with sustainable learning strategies. Meanwhile, the SPOC platform transcends the role of a mere content repository to become a critical enabler that extends the "main arena" for self-directed learning [22]. It offers structured yet personalized learning pathways, allowing students to progress at their own pace [23]. Its interactive and data-driven features—such as asynchronous in-depth discussions, learning analytics, and embedded formative assessment tools—not only make the learning process visible and enable targeted instructor intervention but, more importantly, enhance students' self-monitoring and self-regulation capabilities, granting them genuine autonomy over the time, place, and pace of their learning [24-26]. This systematically designed external instructional framework effectively promotes positive shifts in learners' internal psychological processes: under the joint influence of OBE's clear goal orientation and the SPOC platform's empowering affordances, students transform from "task recipients" into "responsible agents." Within the participatory and reflective cycle of BOPPPS, their cognitive approach evolves from "superficial memorization" to "deep construction" of knowledge. Ultimately, through meaningful, challenging, real-world tasks and interactive experiences, their motivation shifts from being extrinsically driven by grades or attendance to being intrinsically fueled by genuine interest and value recognition in the nursing profession.

4.2 The Hybrid Teaching of BOPPPS Teaching Model Based on OBE Concept and SPOC Platform has a Positive Impact on the Critical Thinking Ability of Nursing Students

Critical thinking, as a core competency essential for ensuring safety, effectiveness, and ethically sound clinical decision-making, holds paramount importance in nursing education [13]. The blended BOPPPS teaching model developed in this study—grounded in the OBE concept and delivered via a SPOC platform—demonstrates a profound and positive impact on cultivating critical thinking abilities among nursing students through its systematic design of "goal orientation, structural scaffolding, and environmental enablement." The model first employs the OBE approach to explicitly define higher-order cognitive outcomes—such as analysis, evaluation, and creation—as essential competencies to be achieved. For instance, a learning outcome like "develop and justify an individualized care plan for a complex clinical case" transforms critical thinking from an abstract ideal into a concrete learning "target," guiding students from the outset to engage in information discrimination, logical reasoning, and comparative evaluation of options. Furthermore, the BOPPPS framework provides a repeatable and traceable "training ground for thinking [27]." Its "Bridge-in" and "Participatory Learning" phases create an authentic "problem space" by presenting real-world clinical scenarios characterized by uncertainty or ethical dilemmas, necessitating active questioning, contextual linking, and clinical reasoning [28]. The "Pre-assessment" and "post-assessment" components help uncover reasoning gaps and foster metacognitive reflection, while the "Summary" phase assists students in distilling generalizable thinking frameworks from specific cases, thereby advancing from experiential learning to methodological mastery. Simultaneously, the SPOC platform significantly expands the dimensions for cultivating critical thinking. Its asynchronous discussion function allows students to engage in deep, literature-based, logically structured, and revisable deliberative exchanges [29]. This textual and structured interaction encourages more prudent argumentation, more

precise use of evidence, and makes the thinking process visible, thereby enabling targeted instructional guidance. More importantly, the model embeds the development of critical thinking within a dual-motivation framework of "self-directed learning" and "professional identity formation [30]." As students experience professional responsibility and competence by achieving high-order outcomes, their drive to cultivate critical thinking shifts from external examination pressure to an internalized value commitment toward becoming a competent and accountable nurse. In summary, this model does not merely impart thinking skills in isolation. Rather, by integrating targeted competency outcomes, a structured training process, and an interactive technological environment, it reconstructs the entire learning ecosystem. This makes the development of critical thinking a natural emergent property and an inevitable requirement in students' pursuit of professional competency, offering a highly operational and theoretically coherent practical pathway for the systematic cultivation of this core literacy in nursing education.

4.3 The BOPPPS Teaching Model Based on the OBE Concept and SPOC Platform is Helpful to Improve the Learning Performance of Nursing Students

Learning performance, encompassing not only academic achievement but also the integration of knowledge, the proficiency of skills, and the sustainability of competencies, serves as a critical indicator of educational effectiveness [31]. The blended BOPPPS model, underpinned by the OBE framework and implemented via a SPOC platform, demonstrates a structured and synergistic approach to significantly improving the learning performance of nursing students [32]. This enhancement is achieved not through isolated interventions, but through a coherent pedagogical architecture that aligns objectives, process, and assessment. Fundamentally, the OBE concept redefines the endpoint of learning, shifting the focus from content coverage to demonstrable competency [33]. By establishing clear, measurable, and clinically-relevant outcomes at the outset—such as "conduct a comprehensive and culturally sensitive patient assessment" or "safely administer a complex medication regimen"—the model provides students with a transparent roadmap for success. This clarity reduces cognitive load related to uncertainty about expectations and directs student effort strategically toward mastering essential competencies rather than memorizing disjointed facts [34]. The alignment of all teaching activities and assessments with these predefined outcomes ensures a consistent and targeted learning experience, where every instructional element contributes directly to performance goals. The BOPPPS instructional framework operationalizes this outcome-oriented approach into a dynamic and engaging learning cycle. Its phased structure scaffolds the learning progression systematically. The Bridge-in phase activates prior knowledge and creates relevance, priming students for deeper engagement. The Objective phase reinforces the OBE goals, maintaining focus. Pre-assessment acts as a diagnostic tool, allowing both instructors and students to identify knowledge gaps early, enabling timely remediation and personalized focus [32]. The core Participatory Learning phase, through case-based discussions, simulations, and collaborative projects, transforms passive recipients into active constructors of knowledge. This active processing is crucial for deep understanding and long-term retention, directly translating into superior performance on applied assessments. Finally, the Post-assessment and Summary phases create essential feedback loops. They offer students opportunities to demonstrate their learning, receive formative feedback, and consolidate their understanding, thereby closing the gap between current and desired performance. The SPOC platform serves as the technological engine that amplifies and extends the effectiveness of this pedagogical design. It enables the consistent delivery of the BOPPPS structure outside the physical classroom, ensuring all students have access to core resources, structured activities, and asynchronous guidance. Its capacity for delivering multimedia content (e.g., procedural videos, interactive diagrams) caters to diverse learning preferences, enhancing comprehension. More importantly, the platform facilitates continuous formative assessment through quizzes, discussion analytics, and peer-review exercises. This provides real-time data on student progress, allowing for early intervention and support. The platform also fosters a learning community where students can learn from each other's questions and insights, thereby enriching the collective understanding and performance. The synergy of these three components creates a powerful ecosystem for improving learning performance. The OBE goals provide direction, the BOPPPS cycle provides the scaffolded journey, and the SPOC platform provides the flexible and data-rich environment. This integration leads to more motivated learners (due to clear relevance and active involvement), more efficient knowledge acquisition and skill development (due to structured practice and immediate feedback), and ultimately, more robust and transferable competencies as evidenced by improved performance in both theoretical evaluations and practical/clinical assessments. Therefore, this model moves beyond merely transmitting information; it systematically engineers the conditions for optimized and sustained learning achievement in nursing education.

5   ETHICAL STATEMENT

All participants were voluntarily recruited through a announcement and provided informed consent prior to their engagement in this study, which guaranteed anonymity and strictly limited the use of responses to research purposes in compliance with standard ethical guidelines.

6   LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

While this study demonstrates the potential benefits of the OBE-SPOC-BOPPPS model, several limitations must be acknowledged to contextualize the findings and guide future research. First, the study was conducted within a single institution and involved a specific cohort of nursing students. The sample size, while adequate for the preliminary

analyses, may limit the generalizability of the results to other nursing schools with different curricula, faculty expertise, student demographics, or technological infrastructures. Multicenter studies with larger and more diverse populations are needed to validate the robustness and transferability of this model across varied educational settings. Second, the assessment of outcomes such as self-directed learning ability and critical thinking, though employing validated instruments, still relies partially on self-reported data and instructor evaluations, which may be subject to biases. While quantitative scores showed positive trends, incorporating more objective, longitudinal performance metrics—such as long-term knowledge retention rates, objective structured clinical examination (OSCE) scores over time, or tracking clinical decision-making performance during internships—would strengthen the evidence for the model's sustained impact. Third, the implementation of this integrated model places significant demands on both faculty and students. The requirement for instructors to design OBE-aligned content, create interactive SPOC materials, and facilitate the BOPPPS cycle represents a substantial time investment and necessitates advanced pedagogical and digital competencies. Similarly, students accustomed to passive learning required an adaptation period to fully engage with the self-directed and collaborative elements. The study's timeframe may not have fully captured this adaptation curve or the potential for instructor fatigue, which could influence long-term sustainability. Finally, the study primarily focused on the educational process and immediate learning outcomes within an academic setting. The ultimate test of any nursing education innovation is its impact on clinical practice and patient outcomes. This research did not trace whether the enhanced competencies observed in the classroom reliably translated into improved performance, confidence, or error reduction in real-world clinical placements or subsequent professional practice. Establishing this critical link remains an essential area for future investigation. Despite these limitations, this study provides a foundational framework and promising evidence for the model's value. The identified constraints clearly delineate pathways for further research and refinement.

7 CONCLUSION

This study developed and validated a blended teaching model that integrates the OBE philosophy, the BOPPPS framework, and the SPOC platform. The findings demonstrate that through its systematic "objective-process-environment" design, the model effectively stimulates nursing students' self-directed learning ability, promotes the development of critical thinking, and enhances their overall learning performance. It shifts the focus of education from teacher-led instruction to student-centered competency development, facilitating a transition from passive reception to active exploration. Whilst limitations remain in terms of generalizability, assessment methods, and implementation requirements, this model offers a clearly structured and practical pathway for transforming nursing education from knowledge transmission to competency cultivation. Future research should focus on conducting long-term, multi-center validations and exploring how such educational outcomes can be consistently translated into enhanced clinical performance, thereby cultivating nursing professionals with lifelong learning competencies who are better equipped to address future challenges in healthcare.

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THE PATHWAYS AND MECHANISMS OF DATA-INTELLIGENCE DISCIPLINARY COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

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Abstract: Driven by the accelerated evolution of the digital economy and the construction of "New Business," data-intelligence disciplinary competitions have emerged as a critical vehicle for cultivating business talents with interdisciplinary integration capabilities, data-driven decision-making skills, and innovative practical literacy. This paper, grounded in multidimensional contexts including macroeconomic and social development, educational policy guidance, technological empowerment, and evaluation system reform, systematically reviews the literature on how data-intelligence competitions empower business talent cultivation. It thoroughly examines the positive impacts of such competitions on students' innovative thinking, interdisciplinary integration abilities, innovation and entrepreneurship literacy, and practical application skills. The study identifies several persistent challenges in the empowerment process, such as the disconnection between competitions and teaching, insufficient resource investment, weak faculty capacity, low student participation awareness, poor integration of professional and innovation-entrepreneurship education, and imperfect evaluation mechanisms. In response, this paper proposes a systematic and actionable optimization pathway and collaborative mechanism from three dimensions: optimizing competition systems and content design, innovating teaching models and curriculum systems, and improving support mechanisms and incentive policies. The aim is to effectively integrate competitions into the entire talent cultivation process, providing theoretical reference and practical guidance for cultivating high-quality business talents in the digital economy era.

Keywords: Data intelligence; Disciplinary competitions; New business; Talent cultivation; Competition empowerment; Innovative practice

1 INTRODUCTION

The background for the role of data-intelligence disciplinary competitions in cultivating business talent is rooted in the triple convergence of the accelerated evolution of the global digital economy, industrial intelligent transformation, and the paradigm shift in higher education[1]. As new-generation information technologies such as artificial intelligence, big data, and cloud computing become deeply embedded in the business ecosystem, the traditional business education model centered on functional division and theoretical instruction can no longer meet the market's urgent demand for interdisciplinary and innovative talents. Against this backdrop, the construction of "New Business" explicitly proposes a "technology + business" integrated development path, emphasizing the cultivation of students' abilities to integrate knowledge from multiple domains, harness intelligent tools, and solve systemic problems within authentic, complex contexts. Data-intelligence disciplinary competition,such as the "Internet Plus" University Student Innovation and Entrepreneurship Competition, the National University Student E-commerce "Innovation, Creativity, and Entrepreneurship" Challenge, and the Business Data Analysis Segment of the National Vocational College Skills Competition—serve as crucial practical carriers for this transformation need[2]. Their rise is an inevitable outcome of the synergistic evolution between supply-side educational reform and demand-side industrial upgrading.

2 BACKGROUND OF DATA-INTELLIGENCE DISCIPLINARY COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

2.1 From a Macro Economic and Social Perspective

China is comprehensively advancing high-quality development and accelerating the construction of a modern economic system driven by new quality productive forces. New quality productive forces are not only reflected in technological breakthroughs and industrial upgrading but more fundamentally require a reshaping of the talent structure. Corporate expectations for business graduates have shifted from traditional competencies in financial analysis, marketing, or human resource management towards higher-order literacies such as data-driven decision-making, human-machine collaborative innovation, and digital business model reconstruction. In fields like smart retail, intelligent manufacturing, and digital finance, practitioners need to simultaneously understand business logic and algorithmic logic, interpret behavioral patterns behind data, and design implementable solutions accordingly [3]. Such capabilities cannot be acquired through single-discipline courses but must be honed in highly simulated, comprehensive tasks. Data-intelligence competitions precisely provide such scenarios. Their topics often stem from real corporate pain points, requiring teams to complete a full-chain practice from problem identification and data collection to model building and

business validation within limited time, thereby compelling students to cross disciplinary boundaries and actively integrate computer science, statistics, design thinking, and management theory.

2.2 From an Educational Policy Guidance Perspective

The Ministry of Education has been continuously promoting the "Four New" construction in recent years. As an important branch of the New Liberal Arts, New Business explicitly advocates interdisciplinary integration, industry education collaboration, and practice-oriented education. Documents such as Opinions on Deepening Undergraduate Education and Teaching Reform to Comprehensively Improve Talent Cultivation Quality emphasize strengthening the cultivation of students practical abilities and innovation and entrepreneurship capabilities," encouraging universities to "incorporate disciplinary competitions into the talent cultivation system." Motivated by such policies, many universities have begun linking high-level competition achievements with credit recognition, awards and honors, and postgraduate recommendation eligibility, forming an institutional pull. More crucially, some institutions have attempted to build an integrated Course-Competition-Certification-Innovation-Application cultivation model, making competition content an organic component of teaching content and realizing a virtuous cycle of promoting teaching, learning, and reform through competitions[4].

2.3 From a Technology Empowerment Perspective

The proliferation of generative artificial intelligence has significantly lowered the barrier for non-technical background students to participate in data-intelligence practices. In the past, business students were often excluded from technology-intensive projects due to insufficient programming skills. Today, with tools like ChatGPT, SciSpace, and AI image generators, they can complete tasks such as literature review generation, code debugging, and visual prototype design through natural language instructions, thereby engaging more deeply in the technological innovation process. Research shows that after using such AI tools in digital business courses, students at the master's level not only gained a deeper understanding of complex concepts but also significantly improved communication efficiency and solution iteration speed in interdisciplinary collaboration[5]. This human-machine collaborative mechanism is reshaping the role positioning of business students from passive recipients to "questioners," "tuners," and "value judges" of intelligent systems—which is precisely the core competency of future business leaders.

2.4 From the Perspective of Evaluation System Reform

The traditional summative evaluation model, predominantly based on final exams, struggles to capture the dynamic development process of interdisciplinary abilities. Data-intelligence competitions, however, naturally fit within multi-dimensional assessment frameworks based on digital rubrics. These frameworks can provide structured scoring of student performance across various dimensions such as originality, technical feasibility, commercial value, social impact, and teamwork[6]. Combined with learning analytics technologies, educators can also track student behaviors during preparation like literature search strategies, frequency of AI tool usage, and number of solution revisions to generate personalized learning profiles and achieve formative feedback throughout the process. This evaluation method not only enhances the objectivity and efficiency of assessment but also makes competency growth visible, intervenable, and optimizable, providing data support for precise talent cultivation.

In summary, data-intelligence disciplinary competitions have become a key lever for business talent cultivation because they accurately respond to the era's demand for interdisciplinary talents, align with the strategic direction of national education reform, leverage the inclusive empowerment of intelligent technology, and promote the scientific evolution of evaluation systems[7]. In the future, with the establishment of regional competition alliances, the development of universal data sandbox platforms, and the exploration of blockchain-based mechanisms for credentialing competency achievements, data-intelligence competitions are expected to become further institutionalized, standardized, and open, truly becoming a core hub connecting education, industry, and innovation.

3 LITERATURE REVIEW ON DATA-INTELLIGENCE DISCIPLINARY COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

Against the backdrop of rapid digital and intelligent technology development, the business talent cultivation model is undergoing profound transformation. Data-intelligence technologies, represented by big data and artificial intelligence, are not only reshaping the business ecosystem and industrial landscape but also posing new requirements for talent's knowledge structure, practical abilities, and innovation literacy. In this process, disciplinary competitions, serving as a vital bridge connecting theoretical learning and practical application, have evolved from traditional knowledge assessment tools to a key mechanism empowering the cultivation of interdisciplinary business talent. Integrating data-intelligence disciplinary competitions into the talent cultivation system can effectively stimulate students' learning initiative, promote interdisciplinary knowledge integration, and systematically enhance their data analysis, intelligent decision-making, and innovative practice abilities through authentic or simulated complex problem scenarios. Research indicates that the competition-based "promoting learning and teaching through competitions" model can significantly enhance students' sense of engagement and accomplishment, thereby optimizing learning experiences and improving educational outcomes[8]. Particularly within the context of New Business construction, the traditional teacher-centered

classroom teaching model struggles to meet the demand for cultivating students' higher-order abilities, while disciplinary competitions provide a dynamic, open, and challenging learning field. For instance, in high-level competitions like the Internet Plus Innovation and Entrepreneurship Competition and the E-commerce Triple-Creation Challenge, student teams must comprehensively apply knowledge from management, economics, information technology, and data science to complete the entire process from market research and business model design to technical implementation and roadshow presentation a process that itself constitutes a complete innovation practice training[9]. Furthermore, research points out that feeding competition outcomes back into teaching and constructing an integrated Course Competition Certification Innovation Application talent cultivation pathway can achieve precise alignment between educational supply and industrial demand, delivering high-quality technical and skilled talent for developing new quality productive forces.

The deep integration of data-intelligence technology has also brought innovation to the competitions themselves. On one hand, AI tools like ChatGPT and SciSpace are used during competition preparation, assisting students with literature reviews, idea generation, and content optimization. This not only improves preparation efficiency but also prompts students to contemplate new human-machine collaborative working models[10]. On the other hand, competition evaluation systems are also evolving towards intelligence. The application of digital rubrics and automated learning analytics technologies makes the assessment of contestants' complex abilities more objective, efficient, and formative[11]. Notably, the effectiveness of this empowerment mechanism highly depends on the overall synergy of the education system. Teachers need the capability to guide students in utilizing data-intelligence tools, the curriculum system needs interfaces for competition articulation, and institutions need to establish corresponding incentive and support policies. Empirical studies find that when competition activities form positive interactions with curriculum teaching, research projects, and corporate practice, their effects on cultivating students' entrepreneurial self-efficacy and enhancing employment competitiveness are particularly significant.

However, empowering business talent cultivation through data-intelligence disciplinary competitions still faces many challenges. First, competition resources are unevenly distributed. Some universities have shortcomings in faculty, platforms, and funding, limiting student participation opportunities. Second, disconnection between competition content and daily teaching persists, failing to fully achieve competition-teaching integration. Furthermore, understanding of the educational value of competitions needs deepening; they should not merely be viewed as a pathway to awards but rather greater emphasis should be placed on their long-term benefits in shaping student resilience, teamwork spirit, and complex problem-solving abilities. Future research and practice should focus on constructing more systematic and normalized competition based education mechanisms, exploring how to use cutting-edge technologies like generative AI to lower the participation threshold for high-quality competition projects, establishing robust systems for competition outcome translation and credit recognition, and ultimately forming an open, inclusive, and sustainable innovative talent cultivation ecosystem.

4 THE IMPACT OF DATA-INTELLIGENCE COMPETITIONS ON BUSINESS STUDENTS' INNOVATION CAPABILITIES

4.1 Cultivating Diversified Thinking in Business Students

The cultivation of business students' innovation capabilities through data-intelligence disciplinary competitions encompasses cognitive restructuring, enhancement of practical abilities, interdisciplinary integration, and the fostering of human-machine collaborative thinking. By simulating complex problems in real business scenarios, such competitions prompt students to break out of traditional classroom knowledge frameworks, actively integrate knowledge from multiple domains like data science, artificial intelligence, and management decision-making, thereby achieving a fundamental shift from passive acceptance to active creation. Research shows that students participating in high-level data-intelligence competitions like the "Internet Plus" Innovation and Entrepreneurship Competition, E-commerce Triple-Creation Challenge, and Big Data Analysis Challenges demonstrate significantly better trends in innovation self-efficacy, problem identification ability, and solution design level compared to non-participating peers[12]. This impact is not accidental but stems from the inherent driving logic of the competition mechanism: it constructs a high-incentive, high-feedback-density learning environment where students continually refine creative thinking through iterating project solutions. Specifically, data-intelligence competitions first stimulate students' deep learning motivation through task-oriented design. Unlike regular course assignments, competition topics are often open-ended, ambiguous, and bound by real-world constraints such as optimizing supply chain forecasting models based on real enterprise datasets or developing new digital marketing content using AI generation technology. These tasks force students to autonomously define problem boundaries, select appropriate tools, and test hypotheses, a process that constitutes the core of innovation training[13].

4.2 Promoting Organic Integration of Interdisciplinary Knowledge

Modern business innovation rarely confines itself to a single discipline, and data-intelligence competitions inherently possess integrative attributes team members must collaboratively complete modules like market analysis, algorithmic modeling, business pitching, and technical implementation. This collaborative model effectively breaks down disciplinary barriers and cultivates systemic innovation thinking. More crucially, with the widespread application of generative AI and research assistance tools, data-intelligence competitions are reshaping the methodological foundation

of innovation. Research indicates that student teams proficient in using AI tools for literature review generation, code debugging, and visual design can devote more energy to high-level creative conception and strategic judgment, thereby enhancing the overall innovation quality of projects. This signifies an evolution in the connotation of innovation capability from "isolated individual flashes of insight" towards "human-machine collaborative cognitive expansion." Simultaneously, the application of intelligent evaluation systems also enhances the malleability of the innovation process. Automated feedback systems based on digital rubrics and learning analytics can multi-dimensionally assess the originality, feasibility, and social value of student proposals, providing immediate improvement suggestions. This makes innovation no longer a black-box trial-and-error process but a trackable, optimizable growth path. This model emphasizes feeding competition content back into the teaching system—for example, transforming past outstanding cases into teaching materials or embedding competition standards into course assessments—thus forming a virtuous cycle.

4.3 Enhancing Business Students' Innovation and Entrepreneurship Capabilities

With the in-depth development of the digital economy, digital technologies such as big data, cloud computing, artificial intelligence, and blockchain are widely applied across all aspects of business activities. Business talents need solid digital literacy to understand and apply these technologies, for instance, using big data analysis for market forecasting, leveraging AI to optimize decision-making processes, and mastering e-commerce platform operations. Traditional business education models struggle to adapt to the digitalized, intelligentized, and globalized development needs of e-commerce; thus, mastery of digital technologies has become an indispensable core competency for business talents. The rapid changes in the digital economy have spawned numerous new business formats and models, such as the rapid growth of cross-border e-commerce. This demands that business talents possess a strong sense of innovation and entrepreneurial spirit, enabling them to identify market opportunities, propose innovative solutions, and put innovative ideas into practice. Disciplinary competitions are considered a key measure for deepening the reform of the innovation and entrepreneurship education system. Through competition participation, students can enhance their problem-solving abilities, teamwork skills, and innovation awareness in practice.

4.4 Strengthening Business Students' Practical Application Abilities

Commercial practice within the context of the digital economy is more pragmatic, requiring business talents not only to possess theoretical knowledge but also to be able to apply theory to practical scenarios to solve real business problems. Disciplinary competitions provide students with opportunities to apply theoretical knowledge in practical settings, helping bridge the gap between theory and practice For example, through project-driven practical teaching models, students can exercise their ability to solve practical problems in real or simulated business environments. Faced with complex business environments and massive data, business talents need powerful comprehensive analysis abilities to examine problems from multiple angles and dimensions and propose effective solutions. The teaching philosophy of "project-driven disciplinary competitions" in electronic practical training aims to cultivate students' independent learning and comprehensive analysis abilities, thereby fostering their problem-solving skills. Activities like mathematical modeling competitions also aim to train students in using mathematical tools to solve practical problems, thereby enhancing their comprehensive analysis capabilities.

5 CHALLENGES FACED IN THE PROCESS OF DATA-INTELLIGENCE COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

While data-intelligence competitions play a significant empowering role in cultivating business students' innovation capabilities, they also face numerous challenges and issues. These problems are mainly reflected in the integration of competitions and teaching, resource investment, faculty competency, student participation, and evaluation mechanisms, constraining the full realization of their effect on cultivating innovative talents.

5.1 The "Two-Skin" Problem of Competition and Teaching

Some universities may exhibit a phenomenon of "competition for competition's sake" when conducting disciplinary competitions. This means competition activities lack deep integration with daily teaching, leading to a disconnect between competition content and the curriculum system. The knowledge and skills students gain from competitions may not effectively feed back into their specialized learning, thereby affecting the educational effectiveness of competitions. If competitions are not effectively integrated into the teaching system—such as in course design, practical training, and graduation projects—their positive effects will be greatly diminished, and they may even become an extra burden for students rather than a driver for promoting innovation.

5.2 Insufficient Resource Investment in University Disciplinary Competitions

Universities often face dilemmas of insufficient equipment and funding when conducting disciplinary competitions. Data-intelligence competitions typically involve cutting-edge technologies like AI, big data, and cloud computing, which place high demands on hardware, software platforms, and experimental environments. Without necessary

material guarantees, students struggle to conduct practical operations and innovative exploration in real or simulated digital environments. Furthermore, insufficient funding may affect the organizational level of competitions, prize settings, and incentives for excellent instructors, thereby reducing the attractiveness and influence of competitions.

5.3 Insufficient Relevant Faculty Strength in Universities

Instructors guiding data-intelligence disciplinary competitions need not only solid professional business knowledge but also mastery of cutting-edge digital technologies. However, there remains a shortage in the "dual-qualified" structure of faculty teams at many universities—that is, a relative scarcity of interdisciplinary teachers who understand both theory and practice, both business and digital technology. The insufficiency of teachers' digital technology competencies and competition guidance capabilities directly impacts students' learning experience and the quality of innovation guidance during competitions. Without high-level instructors, students find it difficult to obtain effective guidance and help when facing complex problems and new technological challenges.

5.4 Weak Student Awareness of Competition Participation

Some students may lack interest in competitions or perceive them as time-consuming and effort-intensive with little relevance to their studies. This may lead to narrow participation in disciplinary competitions, failing to benefit more students and thus limiting the widespread cultivation of innovation capabilities. Additionally, if competition incentive mechanisms are not well-established—for example, if competition achievements carry insufficient weight in comprehensive quality evaluation, credit recognition, or scholarship assessment—it may also affect students' enthusiasm for participation.

5.5 Low Integration Between Professional Education and Innovation & Entrepreneurship Education

Although disciplinary competitions are considered a key measure for deepening innovation and entrepreneurship education system reform, if innovation and entrepreneurship concepts and methods are not effectively integrated into professional competitions, competitions may deviate from their original purpose of cultivating innovative talents For instance, some competitions might overemphasize technical implementation or theoretical application while neglecting critical innovation and entrepreneurship aspects like business model innovation and market demand analysis.

5.6 Inadequate Evaluation Mechanisms

Current university evaluations of disciplinary competitions may focus more on competition outcomes, paying insufficient attention to process indicators such as the cultivation of innovative thinking, enhancement of teamwork abilities, and mastery of problem-solving methods during the competition. The lack of scientific and comprehensive evaluation mechanisms makes it difficult to accurately measure the real effect of competitions on cultivating students' innovation capabilities and cannot provide effective feedback for teaching reform[14].

6 PATHWAYS AND MECHANISMS FOR OPTIMIZING DATA-INTELLIGENCE COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

The pathway for data-intelligence disciplinary competitions to empower business talent cultivation is a multidimensional, systematic process. Its core lies in deeply integrating digital intelligent technology with professional business knowledge through competition activities, thereby cultivating high-quality talents adapted to the digital economy's development[15].

6.1 Optimizing Competition Systems and Content Design

Integrate Cutting-Edge Digital Technologies: Competition content should be closely integrated with frontiers like AI, big data, cloud computing, and blockchain to ensure advancement and practicality. For example, competitions can be designed around themes like big data analysis, machine learning applications in marketing, and intelligent supply chain management.
Promote Interdisciplinary Integration: Encourage business students to participate in data-intelligence competitions from computer science, mathematics, etc., fostering deep integration between business and fields like information technology and data science. This helps cultivate interdisciplinary thinking and complex problem-solving abilities.
Enhance Practicality and Authenticity: Competition projects should stem from real enterprise cases or industry pain points, allowing students to enhance professional skills and career literacy while solving practical problems. For instance, collaborative enterprise projects can be introduced where students provide solutions like digital marketing or data analysis for companies.
Focus on Soft Skills Development: Besides technical abilities, competitions should also value cultivating soft skills such as teamwork, communication, innovative thinking, and critical thinking.

6.2 Innovate Teaching Models and Curriculum Systems

Competition-Teaching Integrated Models: Organically integrate disciplinary competitions into the teaching process, achieving "promoting learning and teaching through competitions." For example, in course design, incorporate competition projects as important components of practical teaching, guiding students to consolidate theoretical knowledge and enhance practical abilities through participation.

Construct Modular Curriculum Systems: In response to the diverse competency demands of the data-intelligence economy, construct modular "foundation + core + expansion" curriculum systems to meet the learning needs and career development directions of different student groups.

Case-Based Teaching and Project-Based Learning: Introduce rich data-intelligence business cases and adopt project-based learning approaches, enabling students to master digital technologies and business knowledge while solving specific problems.

Digital Resource Construction and Sharing: Establish digital teaching resource repositories, including online courses, case libraries, and simulation platforms, providing students with diverse learning resources.

6.3 Improve Support Mechanisms and Incentive Systems

Increase Investment and Provide Resource Guarantees: Increase equipment and funding investment for disciplinary competitions, providing students with a favorable competition environment and necessary technical support. Data-intelligence competitions often involve cutting-edge technologies requiring adequate material guarantees for hardware, software, and experimental environments.

Establish Sound Management Systems: Establish and improve disciplinary competition management systems, clarifying departmental responsibilities to ensure standardized and efficient competition organization.

Develop Robust Incentive and Evaluation Mechanisms: Establish diversified incentive and evaluation mechanisms to encourage active student participation and recognize their efforts and achievements in competitions. Competition results can be incorporated into comprehensive quality evaluations, credit recognition, and scholarship assessments to stimulate student enthusiasm.

Strengthen Inter-university and University-Enterprise Exchange and Cooperation: Encourage exchanges and cooperation between universities and between universities and enterprises, building competition platforms, sharing resources, and elevating competition standards.

In summary, data-intelligence disciplinary competitions are a crucial pathway for cultivating business talent in the context of the digital economy. By optimizing competition systems, innovating teaching models, and improving support mechanisms, students' digital literacy, innovation and entrepreneurship capabilities, and practical abilities can be effectively enhanced, cultivating high-quality interdisciplinary talents that meet the needs of future business society development.

7 CONCLUSIONS

The profound integration of digital intelligent technology and business education has rendered data-intelligence disciplinary competitions a crucial and dynamic path for cultivating high-quality, interdisciplinary business talents in the era of the digital economy. Through a systematic analysis of the background, mechanisms, challenges, and optimization pathways, this study draws the following conclusions:

In summary, data-intelligence disciplinary competitions possess significant value and potential in empowering business talent cultivation. To fully realize this potential, it is essential to move beyond viewing competitions merely as extracurricular activities or award-seeking channels. Instead, they should be systematically integrated into the overall talent cultivation system through top-level design, resource coordination, and mechanism innovation. This will foster a virtuous cycle where competitions promote learning, teaching, and reform, ultimately contributing to the cultivation of innovative and practical business talents who can meet the challenges of the future digital society.

COMPETING INTERESTS

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FROM CULTURAL SELF-AWARENESS TO CONFIDENT COMMUNICATION: CONSTRUCTING AND PRACTICING AN IDEOLOGICAL AND POLITICAL EDUCATION MODEL IN TOUR GUIDING COURSES

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Abstract: In the context of China's educational reform emphasizing ideological and political education (IPE) across all disciplines, how to effectively integrate socialist core values and cultural confidence into professional courses remains a key challenge. This study, grounded in the course "Tour Guiding Business" at Yulin University, proposes and practices a localized IPE model titled "From Cultural Self-Awareness to Confident Communication." The model leverages regional cultural resources—such as Shaanbei folk songs, university revolutionary history, and local heritage—to construct a three-stage pedagogical path of "Infiltration-Internalization-Externalization." Through a blended "Three-Wheel Drive" instructional approach combining thematic embedding, situational experience, and project-driven practice, the course systematically cultivates students' cultural identity, professional ethics, and innovative communication skills. Based on a two-semester implementation with 45 undergraduate students, this paper analyzes the course design, teaching mechanisms, assessment strategies, and preliminary outcomes, while also addressing challenges such as resource integration, teacher capacity, and evaluation sustainability. The study concludes that a culturally grounded, practice-oriented IPE model can significantly enhance students' ideological belonging, cultural confidence, and professional competence, offering a replicable framework for similar regional universities engaged in curriculum-based ideological education.
Keywords: Ideological and political education; Tour guiding; Cultural confidence; Local cultural resources; Pedagogical innovation; Curriculum reform; Yulin University

1 INTRODUCTION

The integration of ideological and political education (IPE) into professional courses has become a central task in China's higher education reform, guided by national policies such as the "Guidelines for Ideological and Political Education in All Courses" [1]. This initiative calls for a seamless fusion of socialist core values with discipline-specific knowledge, aiming to cultivate morally grounded, culturally confident, and professionally competent talents. In the field of tourism education—a discipline inherently linked to cultural interpretation, heritage communication, and national image projection—this task carries particular significance. Tour guides are not merely service providers; they serve as cultural ambassadors, storytellers of history, and interpreters of local identity [2]. Therefore, embedding IPE into tour guide training is not only an educational requirement but also a professional necessity.

However, the implementation of IPE in professional courses often faces challenges such as the "two-skin" problem (disconnection between ideological content and professional knowledge), insufficient teacher training, lack of localized teaching resources, and inadequate assessment mechanisms [3]. In response, this study proposes an innovative IPE model titled "From Cultural Self-Awareness to Confident Communication," implemented in the "Tour Guiding Business" course at Yulin University. The model is built on the unique cultural and historical resources of the Shaanbei region, including its revolutionary legacy, folk traditions, and local heritage, to create a culturally resonant, practice-driven, and value-based learning experience.

Yulin University, as a regional institution with a mission to serve local socio-economic and cultural development, provides an ideal context for this pedagogical experiment. The course redesign aligns with the national strategy of "cultural confidence" (wenhua zixin) and the university's commitment to cultivating "high-quality applied talents." By transforming the traditional tour guiding curriculum into a vehicle for cultural awakening and value internalization, this project contributes to both educational innovation and regional cultural revitalization.

This paper systematically presents the construction, implementation, and preliminary outcomes of the IPE model. Specifically, it addresses the following research questions:
1. How can local cultural resources be systematically integrated into a tour guiding course to achieve IPE objectives?
2. What pedagogical mechanisms facilitate the transition from cultural awareness to confident communication?
3. What are the observable impacts of this model on students' cultural identity, professional competence, and ideological maturity?
4. What challenges remain in sustaining and scaling such a model?
Through a detailed case study, this research offers theoretical insights and practical references for educators seeking to implement IPE in tourism and related fields.

2 BACKGROUND AND THEORETICAL FOUNDATION

2.1 Policy Imperative and the Call for Holistic Education

The pedagogical reform undertaken in this study is fundamentally situated within a significant national educational policy context in China: the promotion of "All-Course Ideological and Political Education" (IPE) [1]. This directive marks a strategic shift from compartmentalized political instruction toward a model where moral, cultural, and political education is deeply embedded within the fabric of all disciplinary teaching. This evolution reflects a broader educational philosophy that prioritizes holistic student development, seeking to synergistically combine the acquisition of professional knowledge with the cultivation of character, ethics, and civic responsibility. In the specific domain of tourism education, this policy imperative acquires distinct professional relevance. It translates into the explicit goal of nurturing tour guides who transcend mere technical proficiency in service delivery to become cultural custodians and national representatives. The ideal graduate is envisioned not only as a skilled practitioner but as an individual deeply rooted in cultural heritage and consciously committed to the projection of national identity, thereby aligning professional competence with ideological purpose [4].

2.2 Cultural Confidence as a Core Educational and Professional Objective

Integral to achieving this holistic aim is the cultivation ofcultural confidence(wenhua zixin), a concept that has gained central prominence in contemporary Chinese socio-political and educational discourse. Cultural confidence denotes a deep-seated pride, assurance, and sense of ownership in one's cultural tradition, revolutionary legacy, and prevailing socialist values. Within the professional sphere of tourism, this concept transcends personal belief to become a critical professional competency and an implicit ideological requirement. A tour guide endowed with genuine cultural confidence is equipped to interpret and narrate local and national narratives with authenticity, persuasive passion, and respectful depth. This capability significantly enriches the tourist experience while simultaneously performing the subtle but powerful work of reinforcing collective identity and national cohesion. However, the development of such profound confidence cannot be effectively achieved through conventional, lecture-based theoretical instruction alone. Scholarly consensus and educational practice suggest that it necessitatesexperiential engagement—a pedagogical approach that immerses students directly and interactively within cultural content, facilitating emotional connection, personal reflection, and the construction of meaning [5]. This underscores the need for teaching methods that move beyond abstraction to embodied, situated learning.

2.3 The Strategic Advantage of Localized Curriculum Design

This need for experiential, meaningful engagement aligns powerfully with the distinct strategic advantage held by regional universities such as Yulin University: the capacity forlocalized curriculum design [6]. Unlike institutions with a more generic national focus, regional universities are uniquely positioned to develop curricula that intimately draw upon, integrate, and respond to local historical narratives, cultural practices, and specific socio-economic needs. This localization strategy offers multiple pedagogical benefits. Firstly, it dramatically increases therelevance and immediacyof learning content for students, who often possess pre-existing connections to the local context, thereby boosting engagement and motivation. Secondly, it directly strengthens the university's role as an active agent inregional development, as it prepares graduates with place-specific knowledge and skills that are directly applicable to local cultural and tourism industries. In the context of tour guide education, localization enables students to develop nuanced, place-specific knowledge and authentic storytelling skills. They learn to interpret and present not a generic national narrative, but the unique historical layers, folk traditions, and community values of their specific region, transforming them into knowledgeable and passionate ambassadors for their local cultural landscape.

2.4 Synthesizing Pedagogical Frameworks for Value Integration

The effective integration of IPE and the cultivation of cultural confidence through localized content necessitate deliberate and robust pedagogical frameworks. Research on value-based education highlights that effective integration relies on instructional models that actively connect abstract values with concrete practice, fostering internalization through action. Established pedagogical approaches such asexperiential learning [7], which emphasizes learning through direct experience and reflection;project-based learning [8], which centers on sustained inquiry into complex, authentic problems; andscenario-based teaching [9], which immerses learners in realistic simulated dilemmas, have been widely recognized for their capacity to foster deep learning and facilitate the internalization of values. The instructional model proposed in this study—the "Three-Wheel Drive" approach—is explicitly designed to synthesize and build upon these established frameworks. It aims to create a structured yet adaptable learning ecosystem that systematically bridges theoretical knowledge acquired in the classroom with the complexities of real-world professional and cultural practice, thereby providing the necessary pedagogical engine to drive the proposed three-stage path from cultural awareness to confident communication.

3 COURSE DESIGN: THE "CULTURAL SELF-AWARENESS TO CONFIDENT COMMUNICATION" MODEL

3.1 Core Pedagogical Architecture: A Three-Stage Developmental Path

The structural foundation of the course redesign is a purposefully sequenced three-stage pedagogical path, designed to systematically guide students from initial exposure to cultural content toward the ultimate goal of confident professional expression and value-driven practice. This path provides a coherent conceptual framework for the entire learning journey, with each stage building upon the previous to facilitate progressive development.Stage 1: Infiltration (Cultural Self-Awareness)constitutes the foundational phase, where students are methodically introduced to local cultural resources. This is achieved through a combination of curated lectures, assigned readings, and organized field visits to sites of historical and cultural significance. The primary objective here is to build a substantive base of declarative knowledge and foster initial recognition, effectively planting the seeds of cultural understanding.Stage 2: Internalization (Cultural Reflection and Identity Formation)represents a critical transitional phase that moves beyond passive reception. Students engage in facilitated critical discussions, compose reflective journals, and participate in creative interpretation exercises. These activities are designed to prompt personal connection, critical analysis, and meaning-making, thereby transforming external cultural information into internalized values, emotional attachments, and a strengthened sense of identity. Stage 3: Externalization (Confident Communication and Creative Practice) is the culminating and application-oriented stage. Here, students are tasked with synthesizing and applying their accumulated knowledge and internalized values through tangible, practical outputs. These include delivering polished tour commentaries, designing original cultural products, and planning detailed thematic tour routes. This stage completes the pedagogical cycle by translating internalized cultural confidence and professional ethics into observable skills and creative actions, thereby demonstrating the integration of ideological maturity with vocational competence. This three-stage progression is visually mapped, illustrating the transformative journey of local cultural resources into professional capability and ideological grounding.

3.2 Modular Curriculum Reconstruction and Integrated Learning

To operationalize the three-stage path, the traditional "Tour Guiding Business" syllabus was deconstructed and reconstructed into three thematically coherent modules. Each module is explicitly aligned with a specific stage of the developmental path and is engineered to deliver an integrated blend of ideological focus, specialized knowledge, and practical activity. Module 1: Tour Guide Professionalism and Ethical Foundation scorresponds to the Infiltrationstage. Its Ideological and Political Education (IPE) focus centers on instilling patriotism, professional integrity, a service ethos, and love for one's alma mater and hometown. The content strategically weaves the university's own history and the revolutionary narratives of the Shaanbei region into the teaching of standard guide codes of conduct and ethics. Corresponding activities, such as immersive visits to the campus history museum and role-playing exercises where students serve as "campus guides," provide concrete, context-rich experiences that make abstract ethical principles tangible and personally relevant.Module 2: Cultural Interpretation and Narrative Skillsaligns with theInternalizationstage. The IPE focus shifts to fostering cultural pride, ethnic unity, and an appreciation for intangible heritage. The core content of this module elevates local cultural forms—including Shaanbei folk songs, dialects, folklore, and historical sites—from background context to primary teaching materials for commentary and narration. Instructional activities like folk song performance workshops and structured storytelling sessions at cultural sites are designed to move students from understanding cultural content to emotionally connecting with it and developing their own authentic narrative voice.Module 3: Tourism Innovation and Local Serviceembodies the Externalizationstage, with an IPE focus on social responsibility, creative contribution, and entrepreneurial spirit. The content expands to include principles of cultural product design, thematic tour planning, and community-based tourism development. The key activity is the "I Love Yulin" cultural and creative product design contest, coupled with red tourism route planning projects. These require students to synthesize all prior learning, engage in teamwork, and produce innovative, practical proposals that serve local cultural and economic development, thereby realizing the transition from learner to proactive creator and contributor.

3.3 Integrative Instructional Strategy: The "Three-Wheel Drive" Approach

The delivery of this reconstructed curriculum is facilitated by a blended and dynamic instructional strategy termed the "Three-Wheel Drive" approach. This strategy ensures that the learning experience is multidimensional, engaging, and consistently bridges theory with practice across all modules. The first component,Thematic Embedding in Theory Sessions, ensures that IPE elements are not treated as isolated add-ons but are seamlessly woven into the fabric of professional knowledge transmission. This is accomplished through the use of specially designed case studies that present ethical or cultural dilemmas, guest lectures from industry practitioners who exemplify value-based service, and curated multimedia resources that bring cultural narratives to life within the classroom context. The second component, Situational Experience in Field Settings, physically extends the learning environment beyond the classroom walls. Organized visits to museums, heritage sites, and cultural centers provide students with direct, immersive encounters with the subject of their study. This situational learning makes cultural and historical content visceral and memorable, providing a concrete reference point for theoretical concepts and fostering a deeper, more empathetic understanding. The third component,Project-Driven Practice in Creative Tasks, anchors the learning in application and creation. Students work collaboratively in teams to tackle real-world or realistically simulated projects, such as developing a full tour commentary for a specific site or creating a business plan for a cultural product. This practice fosters essential

professional skills including collaboration, innovative problem-solving, project management, and practical execution, ensuring that the knowledge and values cultivated throughout the course are pressure-tested and refined in a context that mirrors future professional demands.

4 IMPLEMENTATION METHODOLOGY

The operationalization of the "From Cultural Self-Awareness to Confident Communication" model was carried out through a meticulously designed and systematically executed methodology, encompassing four core components: team and resource preparation, blended learning environment construction, phased implementation, and a multi-dimensional assessment system. This structured approach ensured the model's theoretical integrity was translated into effective classroom and field practice.

4.1 Interdisciplinary Team Assembly and Localized Resource Development

The foundational step involved constituting a purpose-built, multidisciplinary teaching team. This team strategically integrated expertise from tourism management, history, ethnomusicology, cultural product design, and ideological education, thereby embodying the course's interdisciplinary ethos. The collaborative synergy of this team was instrumental in moving beyond a single-discipline perspective, enabling a holistic approach to curriculum design that could authentically bridge cultural content, professional skills, and value education. A critical concurrent task was the collaborative development of localized teaching resources. The team systematically compiled and pedagogically adapted a rich repository of materials, including a curated local cultural case featuring narratives from Yulin's revolutionary history and folk traditions, digital archives of Shaanbei folk song recordings and scores, historical documents from the university and regional archives, and a series of structured project briefs for the "I Love Yulin" creative tasks. This resource development phase was not merely logistical but a scholarly and pedagogical process of transforming raw cultural assets into teachable content that could effectively serve the dual aims of professional training and ideological cultivation.

4.2 Construction of a Blended and Extended Learning Ecosystem

To facilitate a flexible and continuous learning experience that extended beyond the confines of scheduled class hours, the course was embedded within a deliberately constructed blended learning environment. The primary digital hub was the university-adopted online platform "Learning Through". This platform served multiple integrated functions: a centralized repository for all developed teaching resources (readings, audio-visual materials, case studies), an asynchronous discussion forum for deepening thematic exchanges and peer feedback, and a submission portal for assignments including reflective journals and project drafts. This digital infrastructure strategically supported flipped classroom approaches, allowing students to engage with foundational knowledge and cultural content independently, thereby freeing in-person and field-based sessions for higher-order activities such as discussion, simulation, critique, and hands-on practice. The blended model thus created a seamless "online-offline" learning loop that catered to diverse learning paces and styles while promoting student autonomy and continuous engagement.

4.3 Phased and Iterative Implementation Timeline

The project adopted a clear, three-phase implementation timeline spanning a total of 12 months across two consecutive academic semesters (August–October 2024 and September–October 2025), involving a pilot cohort of 45 second-year Tourism Management undergraduates.Phase 1 (Months 1–3): Foundation and Preparationwas dedicated to finalizing the teaching team's internal training, completing the development and testing of all pedagogical resources, and conducting detailed instructional design for each module.Phase 2 (Months 4–9): Full-Scale Delivery and Active Monitoringconstituted the core teaching period. This phase saw the full rollout of the "Three-Wheel Drive" instructional strategy, incorporating thematic lectures, scheduled field visits to sites like the university history museum, and guided project-based learning sessions for the cultural and creative industries and tour route design tasks. Continuous formative feedback and adjustment were hallmarks of this phase.Phase 3 (Months 10–12): Consolidation, Evaluation, and Synthesisfocused on the systematic collection of student outputs, comprehensive analysis of learning outcome data, final assessment, and the synthesis of experiences into a structured project report and refined teaching materials for future iterations.

4.4 Multi-Dimensional and Value-Sensitive Assessment System

A critical and innovative aspect of the methodology was the design of an assessment system explicitly tailored to capture both professional competency development and the more nuanced progression in ideological and cultural understanding. Rejecting a sole reliance on final examinations, the system adopted a balanced, multi-source approach.Formative Assessment (weighted 60%)emphasized the learning process, evaluating consistent classroom and field participation, the depth and criticality of weekly reflective journals, and the quality of mid-term project presentations.Summative Assessment (40%)evaluated integrative learning outcomes through the final project portfolio—assessing the creativity, feasibility, and cultural depth of designs and plans—and a written examination that

employed scenario-based questions to test ethical reasoning and applied cultural knowledge in simulated professional dilemmas. Furthermore,peer- and self-assessment mechanismswere formally integrated into the evaluation of team projects, encouraging students to critically reflect on their own and their teammates' contributions to collaboration, problem-solving, and collective learning. This holistic system aimed to make the "invisible" processes of value internalization and skill development more visible, assessable, and therefore actionable for both students and instructors.

5 PRELIMINARY OUTCOMES AND OBSERVATIONS

5.1 Enhanced Student Engagement and Motivation

The implementation of the "From Cultural Self-Awareness to Confident Communication" model yielded marked improvements in student engagement across multiple dimensions. Notably, attendance and active participation in field-based activities—such as visits to the university history museum and local cultural sites—consistently surpassed those observed in traditional lecture-based instructional formats. This shift suggests that the experiential and situated nature of the learning activities resonated strongly with students, transforming them from passive recipients of information into active participants in their own learning process. Beyond structured class activities, students also demonstrated increased autonomous initiative, voluntarily conducting supplementary research on local cultural topics that extended beyond assigned coursework. This self-directed exploration indicates a genuine curiosity and sense of ownership over the learning content. Furthermore, engagement extended into the digital realm, with online discussion forums hosted on the "Learning Through" platform recording significantly higher levels of student interaction—measured by post frequency, reply depth, and peer feedback—compared to previous iterations of the course that relied more heavily on conventional teaching methods. This triangulation of evidence from attendance, self-directed study, and digital interaction underscores the model's capacity to foster a more dynamic and student-centered learning environment.

5.2 Cultivation of Cultural Confidence and Identity Formation

A central objective of the course was to foster cultural confidence, and preliminary evidence points toward meaningful progress in this domain. Analysis of student reflective essays revealed a perceptible deepening in their emotional and intellectual connection to local heritage. Narratives moved beyond factual description to express personal resonance, pride, and a sense of custodianship toward Shaanbei culture and the university's revolutionary history. This internalization was further manifested in observable student behaviors. Several students took the initiative to learn traditional folk songs or conduct oral history interviews with local elders, actions that signify a transition from academic requirement to personal interest and cultural agency. Perhaps most tellingly, during simulated tour guiding assessments, students exhibited a noticeable shift in their performative style. Their storytelling became more authentic, nuanced, and passionate, moving away from scripted recitation toward personalized interpretation. This evolution in narrative delivery suggests that students were not merely memorizing cultural content but were beginning to embody and confidently communicate its value, reflecting the core transition from "self-awareness" to "confident communication" that the model aims to achieve.

5.3 Advancement of Integrated Professional Competencies

The project-driven, practice-oriented approach of the course facilitated tangible enhancements in students' professional skills, particularly in integrating ethical and cultural dimensions with technical guiding competencies. Final project outputs demonstrated both creativity and practical feasibility. Examples included a thoughtfully designed souvenir series inspired by Yulin's ancient city wall, which incorporated cultural symbols with market considerations, and a detailed "Red Yulin" tour itinerary that strategically wove together revolutionary historical sites with narrative coherence. These outputs evidenced an ability to translate cultural understanding into concrete tourism products. Moreover, role-playing assessments and simulated service scenarios revealed improved student performance in integrating professional ethics and cultural sensitivity into their guide personas. Students more consistently considered issues such as respectful representation of cultural practices, accurate historical interpretation, and responsive communication with diverse tourist profiles. This indicates that the model's emphasis on value-based practice successfully bridged the gap between abstract ethical principles and their application in professional contexts, contributing to a more holistic skill set.

5.4 Challenges and Implementation Considerations

Despite these positive outcomes, the implementation process surfaced several challenges that are critical to acknowledge for future refinement and scalability. A recurring initial hurdle was that some students experienced difficulty in conceptually linking broad ideological themes—such as patriotism or cultural confidence—to the specific, practical tasks required in projects and simulations. This underscores the need for more scaffolded instructional design that explicitly maps the connections between macro-values and micro-actions. Logistically, resource constraints, particularly regarding transportation and coordination, limited the desired frequency and variety of off-campus field

visits, which are vital for immersive situational learning. This highlights a common tension between pedagogical ideals and institutional resource realities. Furthermore, the collaborative nature of the core project work occasionally presented challenges in team dynamics, including uneven participation or conflicts over creative direction. These instances necessitated careful facilitation by instructors to transform potential obstacles into teachable moments about professional teamwork and conflict resolution. Addressing these challenges—through clearer instructional scaffolding, strategic resource allocation, and proactive team management—will be essential for strengthening the model's efficacy and sustainability in future applications.

6 DISCUSSION: MECHANISMS AND SUSTAINABILITY

6.1 Why This Model Works: Key Success Factors

The effectiveness of the "From Cultural Self-Awareness to Confident Communication" model can be attributed to several interconnected factors that align with contemporary pedagogical and ideological education principles. Firstly, the cultural relevance of the curriculum plays a fundamental role. By grounding the course in tangible local resources such as Shaanbei folk songs, university revolutionary history, and regional heritage sites, ideological and political education (IPE) is transformed from abstract concepts into lived, meaningful experiences. This localization strategy resonates with students' intrinsic sense of place and identity, making value internalization more natural and profound [5]. Secondly, the model exhibits strong pedagogical coherence through its clearly defined three-stage path of "Infiltration-Internalization-Externalization." This structured progression ensures that learning evolves systematically from awareness to reflection, and finally to application, providing students with a comprehensible and achievable developmental trajectory [7]. Thirdly, the collaborative nature of the teaching team significantly enriches the learning ecosystem. The multidisciplinary composition—bringing together expertise in tourism, history, music, design, and ideological education—enables a holistic and nuanced exploration of cultural content, modeling the very interdisciplinary integration the course aims to foster [6]. Finally, the model's strong practice orientation ensures that learning is not confined to theoretical understanding. Through project-based tasks such as cultural product design and tour route planning, students actively bridge the gap between ideological values and professional practice. This application-driven approach not only consolidates learning but also cultivates a sense of agency and responsibility, key components of both professional competence and ideological maturity [8].

6.2 Theoretical Contributions to IPE and Professional Education

This study makes several significant contributions to the evolving literature on curriculum-based ideological and political education. Primarily, it proposes and validates a structured yet adaptable pedagogical model for integrating values education into professional training. By articulating the "three-stage path" and the "Three-Wheel Drive" instructional strategy, the research moves beyond general advocacy for IPE integration to offer a replicable operational framework. This framework demonstrates how value-based objectives can be systematically woven into the fabric of discipline-specific knowledge and skill development [3]. Furthermore, the research empirically underscores the power of localization in ideological education. It provides a compelling case study of how regional universities can leverage their unique cultural and historical assets to achieve national educational goals, thereby enriching the discourse on context-sensitive curriculum design [10]. The study also highlights the critical, yet often underemphasized, role of teacher collaboration in curriculum innovation. The success of the model is inextricably linked to the synergistic efforts of a multidisciplinary team, suggesting that effective IPE implementation requires moving beyond individual teacher efforts toward structured, cross-departmental teaching communities [4]. These contributions collectively advance the understanding of how to design professional education that is simultaneously technically robust, culturally grounded, and ideologically coherent.

6.3 Practical Implications for Educators and Institutions

The findings of this study offer actionable insights for educators, curriculum developers, and institutional leaders engaged in similar reforms. A central implication is that IPE must be conceived as an inherently integrated component of the curriculum, not as an appended or peripheral module. The design process should begin with identifying the natural synergies between professional competencies and ideological values, thereby avoiding the "two-skin" problem of forced or superficial integration [1]. In practical terms, educators are encouraged to systematically mine and pedagogically activate local cultural resources. These resources—from local history and folklore to contemporary community practices—serve as powerful, authentic teaching materials that can make ideological content more relatable and impactful. To operationalize such an approach, targeted teacher training and the fostering of collaborative teaching structures are essential. Institutions should invest in developing faculty capacity to design and deliver integrated content and create formal platforms for ongoing interdisciplinary dialogue and co-teaching arrangements [11]. These steps are crucial for translating curriculum models from paper into sustained, high-quality classroom practice.

6.4 Limitations and Avenues for Future Research

While this study provides valuable evidence for the proposed model, it is important to acknowledge its limitations, which in turn outline productive directions for future inquiry. The research is contextually bound to a single course implementation at one regional university, which may limit the generalizability of the findings. To address this, future research could expand to multiple institutions across different regions for comparative analysis, examining how the model adapts to varied cultural and institutional contexts. Additionally, the study primarily captures short-term, course-level outcomes. Longitudinal tracking of graduates is needed to assess the enduring impact of such integrated education on students' professional careers, civic values, and long-term cultural identity. Finally, the rapid advancement of educational technology presents new opportunities for enhancing the model. Future explorations could integrate digital tools such as Virtual Reality (VR) for immersive cultural heritage experiences, or Artificial Intelligence (AI) for personalized learning pathways and automated feedback on narrative skills [9, 12]. Investigating how these technologies can deepen engagement, scale access, and provide new forms of assessment within a values-oriented curriculum remains a promising frontier for research and development [13-14].

7 CONCLUSION

The "From Cultural Self-Awareness to Confident Communication" model represents a meaningful attempt to integrate ideological and political education into professional tourism training. By leveraging local cultural resources and adopting a practice-oriented pedagogy, the course successfully fosters students' cultural confidence, ethical professionalism, and innovative competence. While challenges remain in resource allocation, teacher development, and assessment design, the model offers a replicable framework for other regional universities seeking to implement IPE in a culturally grounded and pedagogically coherent manner. Ultimately, this approach contributes not only to educational reform but also to the broader societal goal of cultivating culturally confident, morally responsible, and professionally capable citizens.

COMPETING INTERESTS

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EXPLORING TEACHING APPROACHES FOR CORPORATE STRATEGY AND RISK MANAGEMENT COURSES INTEGRATING OBE PRINCIPLES WITH IDEOLOGICAL AND POLITICAL EDUCATION

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Abstract: Against the backdrop of continuous innovation in higher education philosophy and deepening integration of ideological and political education into curricula, this paper explores teaching reform and practice for the "Corporate Strategy and Risk Management" course from the perspective of integrating OBE principles with ideological and political education.Guided by the "OBE Approach + Ideological and Political Education" framework, the course objectives were systematically restructured, ideological and political elements were thoroughly integrated, teaching models were optimized, and assessment mechanisms were improved. This resulted in a blended learning structure characterized by "Three Objectives, Three Integrations, and Three Main Threads."Teaching practice demonstrates that this system has achieved positive outcomes in knowledge transmission, competency development, and value formation, providing a reference model for teaching reform in similar courses.

Keywords: OBE philosophy; Corporate strategy and risk management; Ideological and political education in courses; Accounting major

1 INTRODUCTION

The Third World Conference on Higher Education in 2022 further emphasized that organically integrating "moral education" with "talent cultivation" is a key pathway to promoting sustained and harmonious social development. It advocated for building a holistic, experiential educational paradigm centered on student development. We should effectively integrate the 'small classroom' of ideological and political education with the 'big classroom' of society, making moral education more thorough and effective" [1]. This elevated ideological and political education to new heights.As the primary bastion for cultivating national talent, the fundamental mission of higher education institutions lies in fostering virtue and nurturing talent. Professional courses serve as crucial vehicles for unifying knowledge transmission with value guidance.As one of the core courses in accounting, "Corporate Strategy and Risk Management" carries the educational function of bridging professional knowledge with contemporary missions. Outcome-Based Education (OBE), a relatively novel educational philosophy, emphasizes learning outcomes, maintains a student-centered approach, and advocates continuous improvement to cultivate students' practical abilities and lifelong learning competencies [2,3]. This paper integrates OBE principles with course-based ideological and political education in teaching "Corporate Strategy and Risk Management." This approach not only aligns with students' personalized development needs and enhances teaching effectiveness but also guides students in establishing correct worldviews, outlooks on life, and values. It helps students form sound professional values and career development perspectives, equipping them with attitudes of seeking truth from facts, upholding fairness and justice, and pursuing rigorous scholarship. Furthermore, it fosters a spirit of bold exploration and innovative spirit. This approach fully demonstrates the practical value of the course in fulfilling the fundamental mission of "cultivating talent for the Party and the nation."

2 BUILDING THE "OBE APPROACH + IDEOLOGICAL AND POLITICAL EDUCATION" TEACHING SYSTEM FOR "CORPORATE STRATEGY AND RISK MANAGEMENT"

2.1 Reconstructing the Course Objective System

Based on OBE principles and ideological education, this course aligns with national and regional development needs while adhering to the talent cultivation objectives of applied accounting programs in higher education. It establishes a hierarchical framework of course objectives from top to bottom[4], as illustrated in Figure 1.
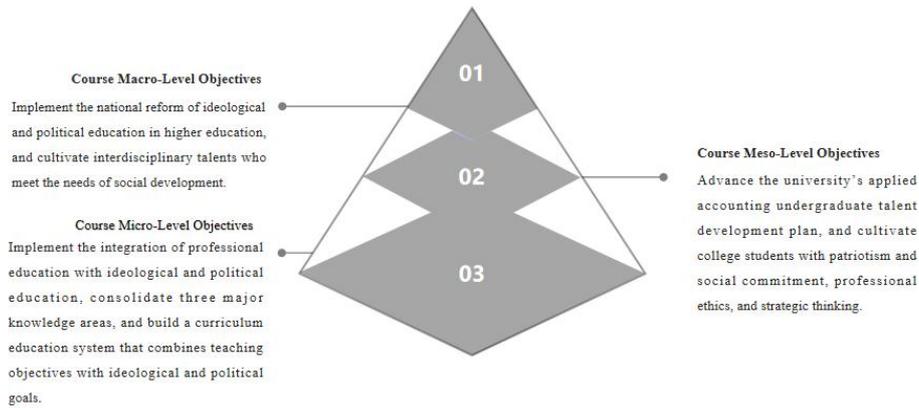
Figure 1 Hierarchy of Course Objectives for Corporate Strategy and Risk Management

At the micro-objective level, a teaching goal system integrating knowledge objectives, competency objectives, and ideological education objectives is established, as illustrated in Figure 2. Building upon this foundation, overall teaching objectives are systematically decomposed into knowledge module objectives, further refined into chapter objectives, and ultimately implemented as individual class period objectives.Through this systematic goal decomposition process, students gain clarity on learning tasks for each class session, instructors effectively manage teaching progress, and dynamic adjustments and continuous improvements are made based on classroom feedback. This approach systematically advances the realization of the trinity of course objectives: knowledge transmission, competency development, and value formation.
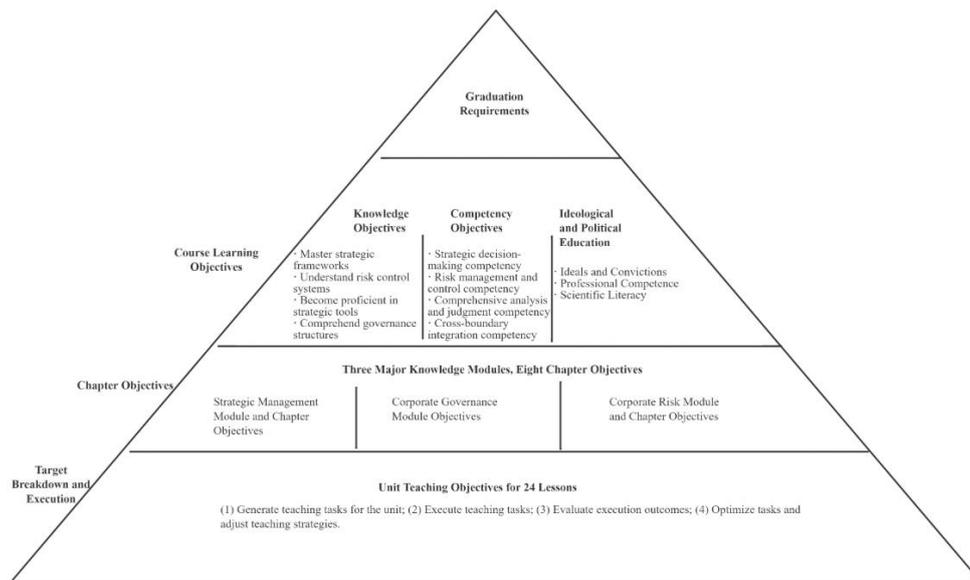

Figure 2 Course Objective Decomposition Diagram for Corporate Strategy and Risk Management

2.2 Deepening Ideological and Political Education in the Curriculum

This course covers three major knowledge modules: strategy and strategic management, corporate governance, and risk management. These modules are closely intertwined with national strategy, corporate development, and personal growth. Centered around the three core course objectives, this paper organizes the course content around three ideological and political education threads—"ideals and convictions," "professional ethics," and "scientific literacy"—to deeply explore the ideological and political elements within the curriculum. The course content and its corresponding ideological and political dimensions are primarily reflected in Table 1.

Table 1 Course Content and Ideological and Political Content for Corporate Strategy and Risk Management

Knowledge Section	Teaching Content	Ideological and Political Elements	Ideological and Political Education Platform	Educational Objectives for Ideological and Political Education
Strategy and Strategic Management	Strategy and Strategic Management	Patriotism and Family Values; Social Responsibility; Innovative Spirit	(1) Strategy, Mission and Objectives, Strategic Innovation Management; (2) The 14th Five-Year Plan, Corporate Missions and Objectives of Huawei, China Mobile, and Others, Huawei's Strategic Transformation.	Cultivate students' rational patriotic conviction to serve the nation strategically and their sense of social responsibility, while equipping them with an innovative spirit and scientific literacy that keeps pace with the times.
	Strategic Analysis	Holistic Thinking Craftsmanship	(1) Strategic analysis framework, corporate core competitiveness; (2) Competitive advantage analysis of "Zhi Zhen Lao Jiao," Zoomlion's "craftsmanship spirit."	Guide students to analyze matters without jumping to conclusions, emphasizing the importance of holistic thinking. Simultaneously, help students understand the significance of craftsmanship in enhancing corporate competitiveness, encouraging them to cultivate their own dedication to excellence. This will empower them to boost both their personal and organizational competitiveness in future careers.
	Strategic Choices	Responsibility and Accountability; Innovative Spirit; Global Perspective; National Pride	(1) Overall strategy, business unit strategy selection, fragmented industry strategy, internationalization strategy; (2) Anta: Multi-brand synergy under a "single-focus" strategy; Huawei: "Technological ascent" under extreme pressure; BYD: From "Battery King" to "New Energy Vehicle Leader."	Understanding that different decisions yield different outcomes, when making choices, one must not only consider personal interests but also the responsibilities borne. One should not be confined by immediate concerns but adopt a global perspective and developmental outlook. Choosing the right path requires perseverance and tenacity, embracing risks without fear, daring to take responsibility, and continuously innovating to achieve goals.
	Strategy Implementation	Teamwork; Accountability; Keeping Pace with the Times	(1) Strategy and Organization, Strategy and Culture, Digital Strategy; (2) N Company's Strategic Failure, "14th Five-Year Plan for Digital Economy Development," "Midea's Digital Transformation."	The successful implementation of a company's new strategy hinges on its organizational structure and corporate culture. During strategic transformation, employees must prioritize collective interests over personal gains, foster a spirit of collectivism, and ensure proactive collaboration across all levels of the team. By responding to national and corporate strategic directives, they will drive the successful execution of the company's strategy. Cultivate students' teamwork spirit and sense of collectivism throughout their professional development journey.
Corporate Governance	Corporate Governance	Rule of Law Awareness; Integrity and Fairness; Responsibility and Accountability	(1) Manifestations and Hazards of Three Major Issues in the Company Law and Corporate Governance; (2) Sun Company's "Tunnel Digging" Practices and Sishui Group's "Insider Control" Problems.	Understand the impact of corporate governance issues on stakeholders, cultivate a sense of social responsibility, enhance students' awareness of the rule of law, and shape their understanding of professional ethics centered on integrity and fairness.
Risk Management	Risks and Risk Management	Risk Awareness; Rigorous Attitude; Rule-Consciousness; Sense of Responsibility	(1) Evolution of risk theory and risk management practices, risk management systems and methodologies, types of corporate risks; (2) Risks faced by "Dada Travel," financial vulnerabilities behind Company D's glamorous facade.	Recognize the importance of risk management and cultivate students' risk prevention awareness; Master risk management processes and develop a rigorous and scientific work ethic; Adhere to risk management standards and enhance legal compliance awareness;

2.3 Refining the Teaching Model

Based on the OBE philosophy and an integrated ideological and political education perspective, this course establishes a blended online-offline teaching model centered on "three objectives, three integrations, and three main threads."Throughout instruction, the OBE teaching philosophy remains central, prioritizing student development and guided by "knowledge objectives, competency objectives, and ideological education objectives." The course integrates with professional roles, vocational certifications, and skills competitions. It unifies three major knowledge modules around the three main themes of ideals and convictions, professional ethics, and scientific literacy. Leveraging both online and offline resources, it delivers blended teaching and learning to achieve ideological education that shapes character and theoretical-practical empowerment.

Specific teaching activities unfold across three phases: pre-class preparation, in-class internalization, and post-class evaluation and reflection. The pre-class preparation phase is designed as a two-way interactive diagnostic learning process featuring "goal-setting, self-directed construction, and assessment and diagnosis."Instructors upload preparatory materials to the Learning Pass platform in advance. These materials include custom PowerPoint presentations, relevant videos and case studies, and assessments. Task milestones are set for students to complete preparatory work within specified time frames using the online platform.During pre-class preparation:Finally, assessment and diagnosis occur as students complete preparatory tests to evaluate their self-study outcomes. This phase enables students to self-diagnose, identify learning challenges, and enter class with specific questions, enhancing learning efficiency. Teachers gain precise insights into students' preparatory status and knowledge gaps, providing data support for subsequent differentiated instruction and focused explanations to achieve targeted teaching.

The in-class internalization phase serves as the core of the teaching process, aiming to transform students' prior knowledge into deep understanding and comprehensive skills. Guided by the principles of "teaching based on learning, goal-oriented, and student-centered," this phase constructs a closed-loop teaching process comprising five interconnected steps: Guiding, Explaining, Practicing, Presenting, and Concluding.(1) Diagnostic Introduction: Activate Cognition. Teachers first reinforce knowledge continuity by reviewing prior knowledge. Subsequently, based on student pre-study feedback, they create problem scenarios using stories, case studies, or news as carriers. This sparks students' learning interest and intrinsic motivation, preparing them cognitively and emotionally for active knowledge construction. (2) Targeted Instruction: Focusing on Difficulties. Teachers deliver in-depth, purposeful explanations addressing common challenges and critical unmastered content identified during pre-class diagnostics. By integrating case studies, task-driven learning, inquiry-based approaches, conceptual frameworks, and scenario simulations, instructors dismantle cognitive barriers and guide students toward deepening their understanding of core knowledge and principles.(3) Targeted Practice for Integrated Empowerment: Exercise design transcends traditional knowledge reinforcement, closely aligning with occupational competency requirements, professional certification standards, and vocational skills competition benchmarks. Tasks integrate knowledge, skills, and values through unified design across three dimensions—knowledge transmission, competency development, and ideological education—facilitating the transformation of theoretical knowledge into practical abilities and professional competence.(4) Outcome Presentation and Assessment Feedback: Students showcase learning achievements through diverse formats like rapid-fire quizzes, group discussions, scenario simulations, and project presentations. This segment not only provides positive reinforcement but also serves as a formative assessment tool. It enables instructors to directly evaluate students' internalization of course content, offering real-time insights for subsequent instructional interventions and personalized assignment assignments.(5) Structured Summary and Systemic Synthesis: At the conclusion of each session, students are guided to systematically organize and synthesize the key concepts and challenges covered. By reconstructing and elevating the knowledge framework, this process helps solidify memory structures, facilitates holistic knowledge internalization, and establishes stable cognitive frameworks.

The post-class evaluation and reflection phase is a critical component of the closed-loop teaching management system. Through systematic assessment and reflection, it achieves continuous improvement in teaching quality. This phase follows the principles of "data-driven, reflection-oriented, and continuous optimization," designed as follows:

(1) Multi-source Data Collection and Instructional Diagnosis: Teachers first integrate all-channel student feedback (e.g., classroom performance, online discussions, in-class quizzes) from both in-class and out-of-class, online and offline sources. Combined with classroom teaching records, this enables comprehensive data collection that provides factual basis for precise diagnosis.(2) Instructional Effectiveness Evaluation and Goal Alignment: Based on the collected multi-source data, teachers conduct formative evaluations of the course's instructional effectiveness. This involves rigorously aligning student learning outcomes with the pre-set three-dimensional goals of knowledge, skills, and ideological-political education. It scientifically assesses the actual achievement of each goal and identifies gaps and areas falling short of expectations. (3) Problem-Focused Root Cause Analysis and Reflective Improvement: Following the evaluation, the process enters a phase of deep reflection.Teachers thoroughly analyze the root causes of unmet teaching objectives, focusing on specific shortcomings in instructional content design, teaching methods and strategies, classroom organization and management, and the effectiveness of teacher-student interactions. By tracing issues back to their origins, they clarify directions for improvement. (4) Targeted Teaching Interventions and Assignment Design: The outcomes of reflection are directly translated into precise teaching interventions. Based on reflections, teachers assign homework with consolidating, expanding, or exploratory characteristics.This addresses identified instructional weaknesses, reinforces students' internalization of key and difficult content, and lays groundwork for achieving objectives in the next teaching cycle. The entire phase ultimately forms a spiral-shaped iterative loop centered on

"evaluation-reflection-intervention." Based on evaluation and reflection conclusions from the current lesson, teaching activities are continuously refined through dynamic adjustments.

3 ESTABLISHING A DIVERSIFIED TEACHING ASSESSMENT SYSTEM

The course assessment system closely aligns with teaching objectives and ideological education requirements, establishing a diversified evaluation mechanism[5,6]. First, it implements multidimensional assessment, shifting from traditional evaluations focused solely on theoretical knowledge and skill development to a comprehensive framework encompassing three dimensions: theoretical knowledge, skill cultivation, and ideological education. Assessment priorities for each dimension are clearly defined based on course content.Second, it incorporates multi-stakeholder evaluations, involving assessments by university administrators, faculty members at the school level, peer instructors, and students. Third, it implements continuous formative assessment throughout the course, evaluating students' learning progress through diverse assessment items during pre-class, in-class, and post-class activities.

Table 2 Assessment Framework for Corporate Strategy and Risk Management Course

Assessment Dimension	Assessment Type	Assessment Phase	Assessment Points	Grade Weight
Knowledge Objectives Competency Objectives Ideological and Political Education	Formative Assessment	Pre-class (Online)	Online viewing progress; Test scores; Discussion Participation	10%
		During Class (Online + In-Person)	Class attendance	5%
			Classroom Interaction	5%
			In-Class Quizzes	5%
			Learning Attitude	5%
		Post-class (Online + In-person)	Online Discussions Homework	10%
	Summative Assessment	Post-class (Offline)	Final Exam	60%

4 TEACHING PRACTICE OUTCOMES

The teaching model integrating OBE principles with ideological and political education has achieved overall positive results. First, since the teaching reform, course ratings have steadily improved. The Corporate Strategy and Risk Management course have risen from 93.1 in early 2021 to the current 95.5 in2025，reflecting progress before and after the 2021 and 2025 teaching reforms.

Statistics from course evaluation questionnaires reveal that regarding the statement "The instructor effectively combined knowledge transmission with values-based guidance, fostering my patriotic sentiments, sense of social responsibility, and moral character," 76.6% of students strongly agreed, 23.4% agreed, while zero students selected strongly disagree, disagree, or neutral. This indicates that the course's ideological and political education outcomes have met expectations.

5 CONTINUOUS TEACHING IMPROVEMENT

Although the course teaching reform has achieved certain results, the course evaluation questionnaire revealed some shortcomings. First, the course content lacks sufficient knowledge updates. Second, teaching methods are not sufficiently innovative. In response to the issues and shortcomings identified in the course evaluation, continuous improvement strategies are proposed to enhance teaching quality.

First, Continuously update course content knowledge. To ensure the course remains advanced and contemporary: - Continuously promote theoretical updates and system optimization of course content, incorporating the latest research developments, technological advancements, and industry trends within the discipline. - Deepen the integration of ideological and political content, organically blending it with course materials.Third, we will continuously update the delivery methods for theoretical knowledge and ideological education. This includes refreshing teaching case libraries and tracking current events and issues in real time. By promptly updating teaching content, we will stimulate student interest and ensure the timely advancement of "knowledge transmission, competency development, and value guidance."

Second, teaching methods are modernized by leveraging artificial intelligence (AI) to empower instruction[7]. Traditional approaches to personalized teaching involve significant workload with limited effectiveness. By integrating AI as an emerging teaching tool across pre-class preparation, in-class internalization, and post-class reflection phases, we enhance teaching efficiency. Additionally, AI-assisted learning profiles enable continuous monitoring of individual student progress, facilitating tailored support and ultimately elevating overall educational outcomes[8].

6 CONCLUSION

The "OBE Concept + Ideological and Political Education" course model and its practical design represent a significant exploration in higher education reform under the New Liberal Arts framework.Guided by the principle of "learning outcomes orientation, consistent student focus, and full integration of ideological and political education throughout the curriculum," this course designed a blended teaching model featuring three objectives, three integrations, and three main threads. It also established a diversified assessment mechanism, effectively enhancing teaching effectiveness. This approach achieved an organic unity of knowledge transmission, competency development, and value cultivation, resulting in a high degree of course objective attainment.

COMPETING INTERESTS

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THE COLLABORATIVE EDUCATION MECHANISM OF FINANCIAL TECHNOLOGY COURSES FROM THE PERSPECTIVE OF CURRICULUM IDEOLOGY AND POLITICS

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Abstract: Against the backdrop of rapid digital economic development and the in-depth application of financial technology, financial technology courses have become essential compulsory courses for economics and finance majors in universities. While promoting financial innovation, financial technology also brings practical issues such as data security, algorithmic ethics, and financial risks, posing higher demands on talent cultivation in higher education. Systematically integrating the concept of curriculum ideology and politics into the teaching of financial technology courses is an important way to implement the fundamental task of fostering virtue through education. From the perspective of curriculum ideology and politics, this paper, based on the teaching practice of undergraduate financial technology courses (conducting a teaching experiment with 80 students from 2 classes during the 2024-2025 academic year) and employing literature research, case analysis, and teaching experiment methods, analyzes the practical dilemmas in the current process of ideological and political education within financial technology courses. It proposes a "Five-in-One" collaborative education mechanism centered on teaching objectives, content, subjects, methods, and evaluation. The paper also summarizes the practical teaching effects, aiming to provide useful references for the ideological and political construction of financial technology courses in universities.
Keywords: Curriculum ideology and politics; Financial technology; Collaborative education; Innovation in teaching methods; Diversified evaluation system

1 INTRODUCTION

With the deep development of the digital economy, the integration of new-generation information technology and the financial industry continues to deepen. Financial technology has become a crucial force driving innovation and efficiency improvements in the financial system. Technologies such as big data, blockchain, and artificial intelligence are widely applied in areas like payment and settlement, credit risk control, asset management, and financial regulation, profoundly transforming traditional financial operation models. In this context, courses related to financial technology have gradually become a significant component of economics and finance programs in universities. Particularly at the undergraduate level, financial technology courses are commonly established as compulsory courses, tasked with cultivating students' digital financial literacy and technical application capabilities.

However, while promoting financial innovation, financial technology also brings numerous practical problems. On one hand, technology-enabled finance helps improve resource allocation efficiency and reduce transaction costs. On the other hand, issues such as algorithmic discrimination, data misuse, privacy breaches, and cross-border transmission of financial risks are increasingly prominent. The rapid development of financial technology imposes higher requirements on practitioners' professional competence and value judgment. If university teaching in financial technology courses merely emphasizes technical tools and business models while neglecting value guidance and responsibility cultivation, it may lead students to form a cognitive tendency of one-sidedly pursuing technical efficiency, which is detrimental to their holistic development and future career growth.

Under the background of higher education reform in the new era, curriculum ideology and politics, as a significant measure to implement the fundamental task of fostering virtue through education, has become an important direction for university curriculum construction. Curriculum ideology and politics emphasizes that all courses should align in their educational goals. It achieves the coordinated advancement of knowledge impartation, capability cultivation, and value shaping by organically integrating value guidance into specialized course teaching. As a professional course highly relevant to real-world financial practice, the content of financial technology courses inherently contains rich ideological and political elements, such as financial risk prevention, scientific and technological ethics, data security protection, and social responsibility, providing a solid foundation for integrating curriculum ideology and politics.

From existing research, academic focus often centers on teaching reform in financial technology courses or singular pathways for integrating curriculum ideology and politics, lacking systematic construction of a "collaborative education mechanism" [1]. In terms of actual teaching situations, the integration of curriculum ideology and politics into current undergraduate financial technology courses is still in the exploratory stage. In some courses, the integration of ideological and political elements lacks systematic design, often presented in a fragmented or supplementary manner, making it difficult to form stable and effective educational outcomes. Some specialized teachers still have confusion regarding the understanding and practical pathways of curriculum ideology and politics, leading to insufficient depth in

the integration between professional teaching and value guidance. These issues, to some extent, constrain the full realization of the educational function of financial technology courses [2].

Based on this, systematically exploring the collaborative education mechanism of financial technology courses from the perspective of curriculum ideology and politics holds significant theoretical and practical value. On one hand, it helps deepen the understanding of the laws governing the integration of curriculum ideology and politics with specialized courses, enriching research on financial technology course teaching. On the other hand, it also contributes to providing operable practical pathways for teaching reform in compulsory undergraduate financial technology courses. Based on the teaching reality of undergraduate financial technology courses, and focusing on the core requirements of collaborative education under curriculum ideology and politics, this paper analyzes the practical dilemmas existing in the current educational process of financial technology courses. It constructs a "Five-in-One" collaborative education mechanism from the dimensions of teaching objectives, content, subjects, methods, and evaluation, summarizes and reflects on its teaching practice effects, aiming to provide useful references for the ideological and political construction of financial technology courses in universities.

2 THE THEORETICAL FOUNDATION OF COLLABORATIVE EDUCATION IN FINANCIAL TECHNOLOGY COURSES FROM THE PERSPECTIVE OF CURRICULUM IDEOLOGY AND POLITICS

2.1 The Connotation and Core Requirements of the Concept of Curriculum Ideology and Politics

Curriculum ideology and politics is a significant achievement of ideological and political education reform in universities in the new era. Its core lies in breaking down the boundaries between ideological and political courses and specialized courses, integrating value guidance into the entire teaching process of all types of courses, and realizing education through all staff, the whole process, and in all aspects. Unlike traditional "ideological and political courses," which focus on specialized theoretical teaching, curriculum ideology and politics emphasizes that specialized courses, while fulfilling the tasks of knowledge impartation and capability cultivation, proactively undertake the functions of value shaping and ideological guidance, enabling students to form correct values and behavioral norms subtly [3,4].

From the perspective of educational objectives, curriculum ideology and politics requires specialized courses to reflect the orientation of fostering virtue through education in goal setting, coordinating the design of ideological and political education objectives with professional training objectives to avoid the tendency of "emphasizing knowledge over education." At the level of teaching implementation, curriculum ideology and politics is not simply about adding ideological and political content. Rather, it emphasizes the natural integration of ideological and political elements into the course knowledge system. Through the selection of teaching content, innovation in teaching methods, and reform of teaching evaluation, it achieves the organic unity of value guidance and professional teaching.

For financial technology courses, whose content is directly related to financial operating mechanisms and socio-economic development, the integration of the concept of curriculum ideology and politics is not only a policy requirement but also an inevitable choice due to the course's intrinsic attributes. Through curriculum ideology and politics construction, students can be guided to correctly understand the relationship between financial innovation and risk prevention while learning professional knowledge of financial technology, enhancing their sense of social responsibility and professional ethics.

2.2 The Basic Connotation of Collaborative Education Theory

Collaborative education refers to an educational philosophy that, in the process of talent cultivation, integrates various educational resources and elements to achieve coordination and cooperation among different educational subjects and stages, thereby forming a systematic and holistic educational pattern. Collaborative education emphasizes the multi-participation of educational subjects and the holistic design of the educational process, aiming to overcome the limited effectiveness of single educational methods [5].

In university course teaching, collaborative education is reflected not only in coordination among courses but also in coordination among different elements within a course, including teaching objectives, content, methods, and evaluation. Through collaborative education, issues such as dispersed objectives, fragmented content, and imbalanced evaluation in the teaching process can be avoided, improving the overall effectiveness of course education.

From the perspective of curriculum ideology and politics, collaborative education is an important pathway to achieve the deep integration of specialized courses and ideological and political education. Only through collaborative design, where value guidance runs through the entire teaching process, can the subtle educational effect of curriculum ideology and politics be truly realized. Therefore, the concept of collaborative education provides significant theoretical support for implementing curriculum ideology and politics in financial technology courses.

2.3 The Intrinsic Alignment Between Financial Technology Courses and the Concept of Collaborative Education

Financial technology courses possess distinct interdisciplinary and practical characteristics. Their teaching content involves multiple fields such as finance, computer technology, data analysis, and risk management. This cross-disciplinary feature dictates that the courses should not only focus on technological implementation but also need to guide students in understanding the economic logic and social impact behind technology applications. The concept of collaborative education can effectively integrate different teaching elements, promoting the fusion of professional

knowledge and value guidance [6].

Furthermore, financial technology courses are closely linked to real-world financial practices, with teaching cases often derived from actual financial scenarios. While financial technology innovation improves financial efficiency, it may also trigger systemic risks and ethical controversies. These real-world problems provide rich material for integrating curriculum ideology and politics. Through a collaborative education mechanism, organically combining technical teaching, case analysis, and value discussions in financial technology courses helps guide students in forming rational and prudent financial concepts.

From the perspective of talent cultivation objectives, financial technology courses aim to cultivate compound talents who possess both professional technical abilities and good professional ethics and social responsibility. The concept of collaborative education emphasizes the coordinated advancement of multiple objectives, which highly aligns with the talent cultivation goals of financial technology courses. Therefore, from the perspective of curriculum ideology and politics, systematically introducing the concept of collaborative education into the teaching of financial technology courses helps enhance the overall educational quality of the courses, laying a solid theoretical foundation for subsequent teaching practice and mechanism construction.

3 PRACTICAL DILEMMAS IN COLLABORATIVE EDUCATION FOR UNDERGRADUATE FINANCIAL TECHNOLOGY COURSES

Promoting collaborative education in financial technology courses from the perspective of curriculum ideology and politics is an important pathway to enhance the educational quality of undergraduate financial technology courses. However, based on current teaching practices of financial technology courses in universities, collaborative education still faces numerous practical dilemmas in its specific implementation. These issues not only constrain the effective implementation of the concept of curriculum ideology and politics but also affect, to some extent, the full realization of the educational function of financial technology courses.

3.1 Lack of Systematic Integration of Curriculum Ideology and Politics

From the perspective of overall course design, the integration of ideological and political elements in some university financial technology courses remains at a fragmented and supplementary level. For example, in a financial technology course at a finance and economics university, ideological and political elements are only concentrated in a 3-class-hour summary session, lacking systematic integration with the course knowledge system and failing to form an educational thread running through the entire teaching process. This fragmented integration approach easily leads to a separation between ideological and political content and professional teaching, resulting in fragmented value cognition among students and difficulty in forming stable risk and responsibility awareness.

Furthermore, some courses express ideological and political educational objectives rather vaguely in their teaching goal setting, failing to make value guidance specific and operable. This leads to a lack of clear guidance during teaching implementation. The integration of ideological and political elements relies more on individual teacher experience and impromptu performance, lacking unified planning and institutional guarantees, thereby affecting the overall effectiveness of collaborative education.

3.2 The Awareness and Capability of Specialized Teachers in Curriculum Ideology and Politics Need Improvement

Financial technology courses have strong professional and technical characteristics. Instructors often have backgrounds in finance, information technology, or data analysis, and their systematic understanding of the concept of curriculum ideology and politics is relatively insufficient. Research shows that 60% of specialized teachers lack training in methods for integrating ideology and politics. Some teachers have misconceptions about curriculum ideology and politics, believing that ideological and political education is primarily the responsibility of dedicated ideological and political courses, while specialized courses only need to focus on knowledge teaching and skill training. This subjectively weakens the initiative for curriculum ideology and politics.

In specific teaching processes, although some teachers acknowledge the importance of curriculum ideology and politics, they lack methods and experience in how to naturally integrate ideological and political elements into financial technology teaching. Some teachers worry that integrating too much ideological and political content might affect the progress of professional teaching or lead to "preachiness" in the classroom, so they often choose to avoid or only touch upon it superficially in practice. This, to some extent, constrains the effective operation of the collaborative education mechanism in financial technology courses.

3.3 Insufficient Value Guidance Function of Teaching Content and Cases

Case-based teaching is an important method in financial technology courses. However, the value guidance function of existing teaching cases has not been fully realized. On one hand, many cases focus on technical implementation paths and business model analysis, emphasizing technological innovation and efficiency improvement, while discussing financial risks, ethical issues, and social impacts relatively less. For example, a case about robo-advisors in a textbook only introduces algorithm model construction without involving ethical controversies such as algorithmic

discrimination and investor protection. This leads students to focus their attention on technical details when analyzing cases, overlooking the value conflicts and responsibility issues brought about by financial technology development.

On the other hand, some cases are not updated promptly, failing to fully reflect new trends and problems in the field of financial technology, resulting in insufficient real-world relevance in case analysis. In the absence of systematic value guidance, it is difficult for students to form a comprehensive understanding of the normative development and risk prevention of financial technology through case studies, which is not conducive to achieving collaborative education goals.

3.4 The Educational Orientation of the Course Evaluation System Is Not Prominent

Regarding the course evaluation system, the current assessment methods for financial technology courses still mainly rely on final exams and skill tests. While the examination of students' mastery of professional knowledge is relatively sufficient, the evaluation of their value cognition, responsibility awareness, and professional literacy is relatively inadequate. There is a certain disconnection between the content of course evaluation and the objectives of curriculum ideology and politics, making it difficult to fully reflect the actual effectiveness of collaborative education in the course. Furthermore, some courses do not pay enough attention to the student learning process in their evaluation, neglecting the educational value of classroom participation, case discussions, and practical activities. This result-oriented assessment approach tends to weaken students' value experiences during the learning process, which is not conducive to the deep integration of curriculum ideology and politics with professional teaching.

4 CONSTRUCTION OF THE COLLABORATIVE EDUCATION MECHANISM FOR FINANCIAL TECHNOLOGY COURSES FROM THE PERSPECTIVE OF CURRICULUM IDEOLOGY AND POLITICS

Addressing the practical problems in the collaborative education process of current undergraduate financial technology courses, it is necessary to systematically design course teaching from the perspective of curriculum ideology and politics. Through the coordinated advancement of multiple elements, the deep integration of professional teaching and value guidance can be achieved. Based on the teaching characteristics of financial technology courses, this paper constructs a "Five-in-One" collaborative education mechanism from the aspects of teaching objectives, content, subjects, methods, and evaluation. The specific implementation paths for each mechanism will be elaborated in detail below, providing clear guidance for the subsequent implementation of teaching practices.

4.1 Synergy in Teaching Objectives: Achieving the Unity of Knowledge Goals, Capability Goals, and Value Goals

Teaching objectives are the starting point and end point of course teaching. In traditional financial technology course teaching, objectives mostly focus on the mastery of professional knowledge and the cultivation of technical skills, with insufficient attention to value guidance and educational goals. From the perspective of curriculum ideology and politics, the teaching objectives of financial technology courses should be systematically restructured to incorporate value goals into the overall objective system of the course.

Specifically, in setting teaching objectives, based on the original knowledge and capability goals, the educational function of financial technology courses in guiding students to establish correct financial perspectives, risk perspectives, and responsibility perspectives should be clarified. For example, while cultivating students' mastery of core financial technology and application capabilities, guide them to understand the relationship between financial innovation and regulatory constraints, and enhance compliance awareness and risk prevention awareness. By making value goals specific and operable, collaborative education at the level of teaching objectives is achieved [7,8].

4.2 Synergy in Teaching Content: Systematically Exploring Ideological and Political Elements in Financial Technology Courses

Teaching content is the key carrier for integrating curriculum ideology and politics. The content system of financial technology courses contains rich ideological and political elements. Through systematic organization and organic integration, the coordinated advancement of professional knowledge and value guidance should be achieved.

4.2.1 Big data finance module: data compliance and privacy protection

Teaching Case: Introduce the real case of "a certain internet financial platform illegally collecting sensitive user data such as contact lists and consumption records for targeted marketing and credit approval." First, explain the technical process of big data collection (e.g., API interface calls, web crawler tools), enabling students to master professional methods of data acquisition. Second, analyze the illegality of the platform's actions based on relevant provisions of the "Personal Information Protection Law" and the "Data Security Law" – collecting sensitive data without users' explicit consent violates the "principle of minimum necessity." Finally, organize discussions on "Where is the boundary between data value mining and privacy protection?" and "As financial technology practitioners, how can we adhere to legal bottom lines in technology applications?" Guide students to recognize that technology applications must be premised on laws, regulations, and ethical norms, strengthening their awareness of data compliance.

4.2.2 Blockchain finance module: technological innovation and financial regulation

Teaching Case: Take "virtual currency mining and speculative trading" as an example. First, explain the core features of

blockchain technology—decentralization and immutability—and the technical underlying logic of virtual currencies. Then, based on China's regulatory policies regarding virtual currencies (e.g., the 2021 joint notice issued by multiple departments "On Rectifying Virtual Currency 'Mining' Activities"), analyze the financial risks (such as money laundering, illegal fundraising, investor losses due to severe price fluctuations) and social harms (such as massive energy consumption by mining and disruption of financial order) brought by virtual currency trading. Finally, guide students to think about "Does technological innovation mean it can operate outside regulation?" and "What are the reasonable application scenarios for blockchain technology?" Enable students to understand that financial innovation must occur within a compliant framework, enhancing their cognition of financial order maintenance and risk prevention.

4.2.3 Artificial intelligence finance module: algorithmic fairness and investor protection

Teaching Case: Select the "Algorithmic Discrimination Incident in a Bank's Robo-Advisor" – due to gender and regional biases present in the training data, the algorithm resulted in generally lower recommended investment returns for female users and users in central and western regions compared to male users and users in eastern regions. In teaching, first analyze the algorithm model of the robo-advisor (e.g., collaborative filtering recommendation algorithms, risk preference assessment models), enabling students to grasp the technical implementation principles. Then, by comparing recommendation result data across different groups, analyze the causes of algorithmic discrimination (bias in training data, unreasonable algorithm parameter settings). Finally, organize debates on "Are algorithms neutral?" and "How should financial technology practitioners avoid algorithmic discrimination?" Cultivate students' rational and prudent financial values and strengthen their awareness of investor protection.

By embedding the above specific cases into different teaching modules, the content of curriculum ideology and politics forms intrinsic logical connections with the professional knowledge system, preventing the integration from becoming superficial.

4.3 Synergy in Teaching Subjects: Building a Collaborative Education Pattern with Multi-party Participation

Teaching subjects are an important guarantee for the effective operation of the collaborative education mechanism. In the teaching of financial technology courses, the leading role of specialized teachers should be fully utilized, while integrating educational resources from multiple parties to form a synergy in promoting curriculum ideology and politics.

On one hand, establish a training mechanism combining "industry-university joint training + paired lesson preparation between ideological/political teachers and specialized teachers." Regularly organize specialized teachers to participate in training on financial regulatory policy interpretation and industry ethics norms, enhancing their awareness and ability to integrate ideological and political elements into professional teaching, and guiding teachers to proactively explore value guidance points in teaching design and classroom organization. On the other hand, clarify the responsibilities of participating parties: industry experts participate in case writing and practical guidance, providing real industry scenarios and ethical dilemma materials; ideological/political teachers provide theoretical support and assist in designing value guidance sessions; counselors participate in post-class practical activities to strengthen educational effects. Through the collaborative participation of multiple subjects, the relevance and effectiveness of curriculum ideology and politics are enhanced [9-11].

4.4 Synergy in Teaching Methods: Promoting the Combination of Case-Based Teaching and Discussion-Based Teaching

Regarding teaching methods, the advantages of case-based teaching and discussion-based teaching in integrating curriculum ideology and politics should be fully utilized. By introducing real financial technology cases, guide students to consider their social impact and potential risks while analyzing technology applications, thereby achieving simultaneous advancement in knowledge learning and value judgment [12].

In classroom teaching, a problem-oriented teaching approach can be adopted, setting layered discussion topics around financial technology cases. For example, when analyzing the case of "algorithmic discrimination leading to credit inequity," first guide students to think about "the technical causes of algorithmic discrimination" (professional knowledge level), then delve into discussing "how to avoid algorithmic inequity through technical optimization and institutional constraints" (value judgment level). During the discussion process, teachers naturally integrate value guidance into professional discussions through guiding questions, avoiding simple preaching and improving the acceptance and influence of curriculum ideology and politics.

4.5 Synergy in Teaching Evaluation: Constructing a Diversified Course Evaluation System

Course evaluation is an important link in examining the effectiveness of collaborative education. In the teaching of financial technology courses, the traditional evaluation system should be optimized, organically combining value evaluation with capability evaluation to form a diversified course evaluation system.

In terms of evaluation methods, adopt a combined model of "process evaluation (60%) + summative evaluation (40%)." Process evaluation includes classroom participation (15%), performance in case discussions (20%), and practical reports (25%), focusing on assessing students' sense of responsibility, risk cognition, and teamwork skills. Summative evaluation adopts the form of "professional knowledge test + value judgment essay questions," examining both

professional skills and students' value orientation. In terms of evaluation content, clarify assessment points for value goals such as "sense of responsibility," "compliance literacy," and "ethical judgment," ensuring high alignment between evaluation and the objectives of curriculum ideology and politics. Through synergy in teaching evaluation, the educational orientation of curriculum ideology and politics is strengthened.

5 TEACHING PRACTICE AND EFFECT ANALYSIS OF COLLABORATIVE EDUCATION IN FINANCIAL TECHNOLOGY COURSES

The key to constructing a collaborative education mechanism for financial technology courses from the perspective of curriculum ideology and politics lies in implementing relevant concepts and mechanisms into specific teaching practices. Based on the "Five-in-One" collaborative education mechanism proposed earlier, and combined with the teaching reality of compulsory undergraduate financial technology courses (80 students from 2 classes during the 2024-2025 academic year), systematic adjustments were made to course content, teaching methods, and the evaluation system, and they were implemented during the teaching process.

5.1 Specific Implementation of the Collaborative Education Mechanism in Financial Technology Courses

At the level of overall course design, guided by curriculum ideology and politics, the teaching objectives of the financial technology course were reorganized, treating knowledge impartation, capability cultivation, and value guidance as an organic whole in course teaching. In terms of course content arrangement, centered on the core knowledge modules of financial technology, the teaching content was structurally optimized. Without weakening the depth of professional teaching, ideological and political elements such as financial risk prevention, scientific and technological ethics, and social responsibility were targeted for integration.

In the implementation of classroom teaching, emphasis was placed on the role of case-based teaching. By introducing representative financial technology practice cases such as "a certain platform's data breach incident" and "the algorithmic discrimination controversy in robo-advisors," students were guided to consider the underlying value issues while analyzing technology applications and business models. For example, when teaching content related to robo-advisors, students were guided to discuss algorithmic fairness and investor protection. When teaching financial data analysis content, students were guided to focus on data compliance and privacy protection issues. Through problem guidance and classroom discussions, students achieved deepened value cognition during their participation in teaching activities [13].

In the practical teaching component, practical tasks such as "identification of ethical risks in financial technology" and "compliant product design" were set based on course characteristics, emphasizing standardized operation and risk awareness cultivation. This guided students to combine professional knowledge with value judgment in practice, enhancing the practical effect of curriculum ideology and politics.

5.2 Analysis of Teaching Effects and Student Feedback

From the perspective of teaching effects, the implementation of the collaborative education mechanism has, to some extent, improved the overall teaching quality of the financial technology course. Quantitative data shows that the number of students participating in classroom discussions increased by 40% compared to before. Post-course surveys indicate that 85% of students can accurately identify ethical risks in financial technology, and 78% can clearly explain the dialectical relationship between financial innovation and regulation.

Students generally reflected that the course content is more closely aligned with real-world financial practice, and they have gained a more comprehensive understanding of the social impact and potential risks of financial technology development. Through case discussions and interactive teaching, students' classroom participation and learning enthusiasm have significantly improved. Regarding learning attitudes, students gradually shifted from solely focusing on technology applications to also considering the normative and responsible aspects behind the technology during the course. They formed a more rational understanding of the relationship between financial technology innovation and risk prevention. This change indicates that the collaborative education mechanism played a positive role in guiding students to form correct values.

5.3 Teaching Reflection and Experience Summary

During the teaching practice process, it was also found that the collaborative education mechanism still faces certain challenges in implementation. Regarding synergy in teaching content, the integration tightness between some ideological and political elements and professional knowledge is insufficient. There is a need to further refine case design and enhance intrinsic logical connections. In terms of teaching time allocation, how to balance the depth of professional teaching with value guidance content within limited class hours still requires continuous exploration and optimization. Regarding synergy in teaching subjects, the frequency and depth of industry experts' participation in classroom teaching need improvement, necessitating the establishment of more stable cooperation mechanisms.

Overall, the practice of collaborative education in financial technology courses demonstrates that by systematically designing and continuously optimizing the "Five-in-One" collaborative education mechanism, curriculum ideology and politics content can be effectively integrated without weakening the effect of professional teaching. Relevant

experiences hold certain reference significance for implementing curriculum ideology and politics construction in other specialized courses.

6 RESEARCH CONCLUSIONS AND PROSPECTS

6.1 Research Conclusions

Based on the perspective of Curriculum Ideology and Politics, this paper focuses on the collaborative education mechanism of undergraduate Fintech courses. Through literature research, case analysis and teaching experiments, combined with theoretical combing, dilemma analysis, mechanism construction and practical verification, the following core conclusions are drawn:

Firstly, the integration of curriculum ideology and politics with financial technology courses has inherent necessity. The interdisciplinary and practical characteristics of financial technology, along with real-world issues such as data security and algorithmic ethics faced in industry development, provide a natural carrier for integrating value guidance into professional teaching. Collaborative education theory provides a scientific path for their deep integration, and the two are highly aligned in talent cultivation goals.

Secondly, there are four major practical dilemmas in the current collaborative education of undergraduate financial technology courses: lack of systematic design in integrating curriculum ideology and politics, insufficient awareness and capability of specialized teachers in curriculum ideology and politics, weak value guidance function of teaching content and cases, and lack of prominence in the educational orientation of the course evaluation system. These problems constrain the full realization of the courses' educational function.

Finally, by constructing the "Five-in-One" collaborative education mechanism encompassing "teaching objectives, content, subjects, methods, and evaluation," the aforementioned dilemmas can be effectively addressed. Teaching practice shows that this mechanism can achieve the coordinated advancement of knowledge impartation, capability cultivation, and value shaping. Students' risk cognition, sense of responsibility, and professional literacy in financial technology have significantly improved, achieving dual optimization of course teaching quality and educational effectiveness.

6.2 Research Prospects

Although the collaborative education mechanism constructed in this paper has achieved initial results in teaching practice, there is still room for further improvement and expansion. Future research can be deepened in the following three aspects:

In terms of research scope, expand the sample to over 10 different types of universities (covering comprehensive universities, finance and economics universities, and science and engineering universities), collect 200 teaching cases for comparative analysis, explore the adaptability differences of the collaborative education mechanism under different institutional orientations, and extract more universal implementation pathways.

In terms of mechanism optimization, continuously update the ideological and political element library and teaching case library in conjunction with technological innovations and changes in industry regulation within the financial technology field. Focus on strengthening teaching design for content related to ethical controversies and regulatory challenges brought by new technologies like artificial intelligence and big data. Simultaneously, explore new forms of collaborative education under blended online and offline teaching models, such as using virtual simulation platforms to simulate financial ethical dilemmas, enhancing the timeliness and influence of value guidance.

In terms of the evaluation system, develop three-level evaluation indicators (cognitive level, practical level, literacy level) for value goals such as "sense of responsibility," "compliance literacy," and "ethical judgment," and clarify the quantitative standards for each indicator. Introduce industry and enterprise participation in the evaluation process, constructing a "university-industry-society" multi-party linkage evaluation mechanism to more comprehensively and objectively reflect the actual effectiveness of collaborative education. This would provide more precise improvement bases for the ideological and political construction of financial technology courses.

In the future, with the continuous advancement of curriculum ideology and politics construction and the ongoing development of the financial technology industry, it is necessary to continuously deepen the concept of collaborative education, dynamically optimize the education mechanism, cultivate more compound financial technology talents with both professional competence and a sense of responsibility, providing solid talent support for the healthy development of the digital economy.

COMPETING INTERESTS

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