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Research on the Integration and Evaluation Method of Intelligent Interaction Design and Visual Communication Design Education Content Based on Fuzzy Logic Reasoning Algorithm

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ABSTRACT
The effective integration of intelligent interaction design and visual communication design education is an important attempt to improve the educational effect. This paper firstly constructs the evaluation system for the teaching effect of intelligent interaction design and visual communication design courses, and then establishes a set of evaluation models based on fuzzy logic inference algorithm. In the example application part, the G1-entropy weighting method designed in this paper is used to measure the weights of each influence index, followed by an empirical study using School A as an example, and finally the multiple linear regression analysis is used to make further exploration on the influencing factors of the teaching effect of the course. The study concludes that in the subjective weight calculation experiment, it is found that the weight of external influences accounts for the highest proportion of 0.277, that is, experts believe that the overall planning has a strong influence on the course effect. Further, the regression modeling yields that learning interest, curriculum, faculty, teaching content, and practical activities have significant positive correlation with teaching effectiveness.

Keywords: fuzzy logic inference algorithm, combinatorial empowerment, multiple linear regression, educational content integration

1. Introduction

With the continuous development of science and technology, the field of education has ushered in the tide of digitization and intelligence, and intelligent interactive education design and visual communication education design, as a new type of education mode, provide students with a more vivid,

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graphic, and personalized learning experience through the integration of multimedia technology, network technology, and virtual reality technology, etc. [1-4].

Intelligent interactive design education classroom has become one of the important directions for the development of the education field, which provides students with a more efficient, convenient and interesting learning environment by using advanced technology, so that students can better acquire knowledge and skills in the classroom [5-8]. One of the greater advantages of the intelligent interactive education classroom is that it can provide more accurate and comprehensive assessment results for the classroom through data analysis technology. By collecting and analyzing students' learning outcomes, learning habits, learning interests and other data, teachers can provide more accurate assessment and guidance to students, and also better meet students' individualized learning needs [9-12]. The ultimate goal of the intelligent interactive education classroom is to provide students with a more efficient, convenient and interesting way of learning, so it needs to be examined in terms of both usage scenarios and effect measurement [13-15]. And visual communication design, as a creative art form, combines design and communication, aiming to express information and ideas in an aesthetic form. In education, visual communication design achieves the communication of teaching and learning content through elements such as images, colors, shapes, and lines, which are transformed into a meaningful visual language [16-19].

The article firstly expounds the concept and teaching content of the intelligent interaction design and visual communication design course, and establishes the evaluation system of the course effect of the integration of the content of intelligent interaction design and visual communication design in four dimensions, namely, overall planning, daily construction, educational achievements and external influence. Next, it explores the calculation method of indicator assignment using the combination of entropy weight method and order relationship analysis method, and proposes the evaluation model of weighted fuzzy logic inference algorithm on the basis of fuzzy theory. Subsequently, the method of this paper is applied to quantify the indicators, calculate the subjective and objective weights and comprehensive weights of the indicators, and evaluate the level of the curriculum. At the same time, school A is used as an example to carry out the research, and finally, multiple linear regression analysis is used to explore the factors affecting the teaching effect of intelligent interaction design and visual communication design courses, and finally the regression model is listed.

2. Intelligent Interaction Design and Visual Communication Design courses

2.1. Curriculum philosophy

Intelligent Interaction Design and Visual Communication Design course, as an effective teaching method that is suitable for teaching contents with outstanding experimental, practical and operative qualities, the core of the course is to build up an interesting situation that is sufficient to arouse students' enthusiasm for learning and desire for inquiry, and to lead learners to realize the accumulation of knowledge and enhancement of their abilities in the course of carrying out the set tasks by virtue of the tasks that are closely related to the teaching objectives. This course shows a distinctive quality, that is, the task is like a bright candle illuminating the learning path, the cultivation of knowledge and skills is like a spring in the dark to moisten the growth, the teacher controls the whole situation as a guide, and the students actively participate in the main body. Based on this, the task-driven teaching method is integrated into the introductory course, and through the rich and diversified design propositions and unique forms of flipped classroom, etc., students are prompted to stimulate their inner subjective initiative and participate in classroom interactions in a virtuous cycle of “questioning and learning”, and then accurately grasp the knowledge system, competency level, and skills of the course while interacting with each other in the question and answer sessions. In this way, students can accurately grasp the knowledge system, ability level and quality dimension of the course while interacting with the questions and answers.

2.2. Teaching and learning implementation

2.2.1. Co-development of teaching tasks and integration of teaching resources for the introduction to specialization. In order to better align with the needs of enterprises, the school through exchanges with enterprises to grasp the status of employment needs of enterprises, to understand the current state of development of the industry, the future development trend, to know what knowledge and skills are valued by enterprises, what positions students can be engaged in after graduation in the enterprise, what are the skill requirements of the positions, how to solve the talent needs of enterprises in the talent cultivation process in the school, to change the traditional teaching methods and introduce the urgent needs of enterprises into the classroom to promote the sound development of teaching reform. Changing the traditional teaching methods, introducing the urgent needs of enterprises into the classroom, and promoting the benign development of teaching reform.

2.2.2. Teaching and learning process:

1) Three questions in one lesson to promote learning through questioning. After each lesson, ask the students, ask yourself, ask your peers, you can understand the gains and losses of teaching, and help teachers professional advancement. In turn, classroom teaching can be refined, and the effectiveness of teaching has also increased significantly.

2) Flipped classroom, student lecture and assessment. Based on a specific topic, students will be divided into nine groups, through a random draw to determine the order of each group to explain, the teacher is given the framework of the subject, after the class, students in small groups to complete the PPT production, in order to ensure that each student's participation, the teacher in the class randomly selects people in the group, teachers and students to question the class, which effectively and powerfully enhances the enthusiasm of the students to participate in the class, and significantly strengthens the core competencies of the students to analyze the problem and to solve the problem, and provides students with comprehensive literacy skills. This has strengthened students' core ability to analyze and solve problems, built a solid foundation for students' comprehensive literacy development, and helped them to move forward steadily on the road of knowledge exploration and practical application.

3) School-Enterprise Collaboration, Classroom on the Cloud. This cooperation further opens the mode of "school-enterprise" cooperation, which provides a broader internship and employment platform for students and brings together many excellent talents for enterprises. For students, they can not only learn more professional quality and practical skills through practice, but also have the opportunity to work closely with enterprises to achieve mutual benefit and win-win situation.

3. Construction of a system for evaluating the effectiveness of the curriculum

In order to scientifically and reasonably evaluate the teaching effect of the intelligent interaction design and visual communication design course, this section draws on the relevant results of the research on the effect evaluation index system in terms of quality education in recent years to design the evaluation system of the course effect. The evaluation system of the teaching effect of intelligent interaction design and visual communication design course is shown in Table 1.

Table 1. Evaluation of mode effect of talent training

Primary indicator	Secondary indicator
Overall planning(A_1)	Culture orientation(A_{11})
	Culture planning(A_{12})

	Institutional construction(A_{13})
Daily construction(A_2)	Environmental construction(A_{21})
	Teacher construction(A_{22})
	Curriculum construction(A_{23})
	Activity construction(A_{24})
	Scientific research(A_{25})
Education results(A_3)	Student achievement(A_{31})
	School results(A_{32})
External influence(A_4)	Industry and policy implications(A_{41})
	Social impact(A_{42})
	International influence(A_{43})

4. Evaluation models based on fuzzy logic inference algorithms

4.1. Fuzzy correlation theory

4.1.1. Fuzzy theory. Fuzzy mathematics comes from real life and it represents an uncertainty that can be applied when something cannot be measured precisely. When conducting research and analysis, you often encounter some uncertain situations, how to transform these uncertain situations into quantitative analysis, then the concept of fuzzy mathematics will be applied.

Fuzzy mathematics, like geometric mathematics, probabilistic mathematics, statistical mathematics, etc., are an essential part of the development of mathematics. The difference is that fuzzy mathematics mainly solves the problem of fuzzy phenomena, whereas geometric mathematics mainly solves the problem of the geometry of a certain definite quantity, probability theory solves the problem of the probability of a certain event, and statistics mainly investigates the problem of definite quantities. Fuzzy mathematics is a fuzzy phenomenon with mathematical specific, clear representation, in many real-life situations, good use of fuzzy mathematics is more conducive to the solution of the problem. In many real-life situations can not be expressed in terms of right and wrong questions, for example, a person's weight is 60 kilograms, some people think that this figure is fat, and some people think that this figure is thin. Situations such as these cannot be measured by a precise concept, then fuzzy mathematical concepts need to be used to represent them. Fuzzy mathematics is even more advantageous when dealing with complexity and making linguistic evaluations in an uncertain environment. Nowadays, fuzzy mathematical theories have been applied in many fields such as government management, business operation, scientific skills and so on, and all of them have excellent results.

4.1.2. Fuzzy sets and operations. Fuzzy set refers to a set way to represent the fuzzy concept of the thing under study, construct the corresponding affiliation function, and analyze the thing through fuzzy operation. The definition of fuzzy set is shown in (1).

Let the maximum possible range of the object under study (i.e., thesis domain) be U, then a mapping relation from thesis domain U to $[0,1]$:

$$u_i : U \to [0,1], y \to u_i(y) \tag{1}$$

where i is a fuzzy set on the domain U, and u_i is an affiliation function with range i in $[0,1]$. When the value of $u_i(y)$ is larger, it indicates that y has a larger degree of affiliation to i. Conversely, it is smaller. When $u_i(y)$ is in the range of $[0,1]$, i is transformed into an ordinary set [20].

The operation of fuzzy sets is extended from the operation of ordinary sets The specific operation rules are shown in (2).

Let there be two fuzzy sets as i and j:

$$
\begin{aligned}
& i = j \Leftrightarrow i(y) = j(y), \forall y \in U \\
& i \subset j \Leftrightarrow i(y) \le j(y), \forall y \in U \\
& (i \cup j)(y) = i(y) \vee j(y), \forall y \in U \\
& (i \cap j)(y) = i(y) \wedge j(y), \forall y \in U \\
& i^c(y) = 1 - i(y), \forall y \in U
\end{aligned} \tag{2}
$$

where $i \cup j$ means i and j, inj means i and j, and $i(y)Vj(y)$ means the maximum of $i(y)$ and $j(y)$. $i(y) \wedge j(y)$ is the minimum of $i(y)$ and $j(y)$. i^c is the complement of i.

4.1.3. Determination of the Affinity Function. The most important thing in the fuzzy mathematics discipline is to calculate the degree of affiliation of the research object, and the key to calculate the degree of affiliation of the research object lies in the construction of the affiliation function that fits the real situation. Since there are many different fuzzy concepts in the actual situation, experts and scholars have proposed various affiliation functions in order to describe these fuzzy concepts more appropriately, including the trapezoidal affiliation function, the bell-shaped affiliation function, the triangular affiliation function, the Gaussian affiliation function, etc. In different fuzzy concepts, it is important to calculate the affiliation degree of the research object, and the key to calculate the affiliation degree of the research object is to construct the affiliation function that fits the real situation. Under different fuzzy concepts, different affiliation functions should be chosen to describe them, so that the degree of affiliation of the elements can be calculated more accurately.

Many methods have been proposed by experts and scholars for determining the affiliation function, including the exemplification method, expert empirical method, fuzzy statistical method, and binary comparative ranking method. The example method mainly refers to estimating the affiliation function of fuzzy set i based on a finite number of previously determined fuzzy values. The basic idea of the expert experience method is to determine the affiliation function of fuzzy set i according to the past experience of experts in applying the affiliation function in describing fuzzy concepts, and to improve it. The fuzzy statistics method is mainly based on fuzzy statistics and is calculated according to the actual existence of the elements. The Binary Comparison and Ordering Method uses a certain characteristic as the basis for comparing and ordering multiple things to determine the approximate affiliation function.

4.2. Methodology for calculating indicator weights

4.2.1. Sequential relationship analysis. The subjective weights of the secondary indicators are determined using the G1 method. Let $I_1, I_2, \ldots, I_m$ be m evaluation indicators, and the j rd evaluation indicator is denoted by I_j. The steps for determining the weight of each secondary indicator by the G1 method are as follows:

1) Determine the ordinal relationship between the indicators. Experts rank the indicators according to their level of importance, and if the i st indicator is more important than the j nd, it is expressed as $I_i > I_j$. If the relationship formula $I_1^* > I_2^* > \cdots > I_m^*$ is determined for indicator $I_1, I_2, \ldots, I_m$, it is said that $I_1, I_2, \ldots, I_m$ determines the ordinal relationship according to "$>$".

2) Give the relative importance between two neighboring indicators I_{j-1}^* and I_j^*. Let u_{j-1}^* and u_j^* represent the weights of the $j.1$th evaluation indicator I_{j-1}^* and the jth evaluation indicator I_j^*

after sorting, respectively, then $r_j = u_{j-1}^* / u_j^*$ represents the relative importance between these two indicators. Among them, the ratio of relative importance between neighboring indicators.

3) Calculation of weights u_j^*. The formula for calculating the weight u_j^* of each indicator after sorting is shown in (3) and (4):

$$u_m^* = \left[1 + \sum_{k=2}^{m} \prod_{j=k}^{m} r_j\right]^{-1} \tag{3}$$

$$u_{j-1}^* = r_j u_j^* (j = 2, \ldots, m-1, m) \tag{4}$$

4) Calculation of weights u_j. Determine the weights of the pre-ranking indicators u_j based on the weights of the post-ranking indicators u_{j}.

4.2.2. Entropy weight method. The entropy weight method is used for determining the objective weight of each secondary indicator. There are m evaluation indicators, each evaluation indicator has n evaluation samples, x_{ij} represents the evaluation value of evaluation sample R_i on the j th evaluation indicator, forming the original data matrix $\left(x_{ij}\right)_{n \times m}$:

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1m} \\ x_{21} & x_{22} & \cdots & x_{2m} \\ \vdots & \vdots & \vdots & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{nm} \end{bmatrix} \tag{5}$$

The steps for determining the weights of each secondary indicator by entropy weight method are as follows:

1) Normalization of data. Since the unit of measurement of each indicator may be different, the original data need to be normalized first. Among them, the positive and negative indicators have different numerical meanings, if the larger the value is the more favorable to the results, the indicator is called a positive indicator, and vice versa is called a negative indicator [21]. The corresponding formulas for the two indicators are shown in (6) and (7), respectively:

$$x'_{ij} = \frac{x_{ij} - \min\left\{x_{1j}, x_{2j}, \cdots, x_{nj}\right\}}{\max\left\{x_{1j}, x_{2j}, \cdots, x_{nj}\right\} - \min\left\{x_{1j}, x_{2j}, \cdots, x_{nj}\right\}} \tag{6}$$

$$x'_{ij} = \frac{\max\left\{x_{1j}, x_{2j}, \cdots, x_{nj}\right\} - x_{ij}}{\max\left\{x_{1j}, x_{2j}, \cdots, x_{nj}\right\} - \min\left\{x_{1j}, x_{2j}, \cdots, x_{nj}\right\}} \tag{7}$$

The normalized data matrix is noted as $\left(x'_{ij}\right)_{n \times m}$.

2) Calculate the weight of the i rd sample value under the j nd indicator for that indicator:

$$p_{ij} = \frac{x'_{ij}}{\sum_{i=1}^{n} x'_{ij}}, \left(i = 1, 2, \ldots, n; j = 1, 2, \ldots, m\right) \tag{8}$$

3) Calculate the information entropy of the j st indicator:

$$e_j = -\frac{1}{\ln(n)} \sum_{i=1}^{n} p_{ij} \ln\left(p_{ij}\right), j = 1, 2, \ldots, m \tag{9}$$

4) Calculate the weight of indicator j:

$$d_j = 1 - e_j \tag{10}$$

$$v_j = \frac{d_j}{\sum_{j=1}^{m} d_j} \tag{11}$$

where e_j is called the entropy value of the j nd evaluation indicator I_j and v_j is called the weight of the evaluation indicator I_j.

4.2.3. Combination of empowerment methods. Setting:

$$w_j = \beta \mu_j + \left(1 - \beta\right) v_j \tag{12}$$

where β and $\left(1-\beta\right)$ are the proportion of main and objective weights in the combination weights, μ_j and v_j are the main and objective weights of the j th indicator, and w_j is the combination weight of the j th indicator.

The optimization mathematical model is used to determine β:

$$Min\left(\sum_{j=1}^{m}\left[\left(w_j - \mu_j\right)^2 + \left(w_j - v_j\right)^2\right]\right) \tag{13}$$

The joint formula, simplified, gives:

$$\begin{cases} Min\left(\sum_{j=1}^{m}\left[\left(\mu_j - v_j\right)^2\left(2\beta^2 - 2\beta + 1\right)\right]\right) \\ \beta > 0 \end{cases} \tag{14}$$

where $\sum_{j=1}^{m}\left(\mu_j - v_j\right)^2$ is a constant value, so when $\beta = 0.5$, satisfies Eq. Therefore, the optimal portfolio weights are dominant, and the objective weights all account for 0.5 of the portfolio weights, that is:

$$w_j = 0.5\mu_j + 0.5v_j \tag{15}$$

4.3. Weighted Fuzzy Logic Reasoning Approach

In the weighted fuzzy logic inference method, each inference rule is expressed in the following clause form:

$$W_1 * P_1, W_2 * P_2, \cdots, W_n * P_n \xrightarrow{CF} P \tag{16}$$

1) $P_i(i = 1, 2, \cdots, n)$ is a premise, a fuzzy quantity. Each P_i is assigned a "degree of truth" $T\left(P_i\right)$, $0 \le T\left(P_i\right) \le 1$, which indicates the degree of confidence that the premise is "true".

2) W_i indicates the importance of each premise, i.e., the weight, $W_i \ge 0$, and $\sum_{i=1}^{n} W_i = 1\left(i = 1, 2, \cdots, n\right)$.

3) * is an ordinary multiplication sign. $\to$ means “push out”. CF is the confidence factor of the rule, which indicates the confidence that the rule is true, $0 \le CF \le 1$. P is the conclusion, which is a fuzzy quantity.

Reasoning by applying the rule results in the introduction of the conclusion P as the credibility of the truth, i.e., truth $T(P)$:

$$T(P) = CF * \left[\sum_{i=1}^{n} W_i * T\left(P_i\right) \right] \tag{17}$$

If there exists more than one rule introducing the same conclusion, it is denoted as:

$$\begin{gathered} W_{11} * P_{11}, W_{12} * P_{12}, \cdots, W_{1n1} * P_{1n1} \xrightarrow{CF1} P \\ W_{21} * P_{21}, W_{22} * P_{22}, \cdots, W_{2n2} * P_{2n2} \xrightarrow{CF2} P \\ \vdots \\ W_{m1} * P_{m1}, W_{m2} * P_{m2}, \cdots, W_{mnm} * P_{mnm} \xrightarrow{CF_m} P \end{gathered} \tag{18}$$

The truth degree of the conclusions inferred by each rule is calculated as $T_i(P)\left(i = 1, 2, \cdots, m\right)$ separately using the formula, and the combined application of the above rules introduces the truth degree of the final conclusion P as: $T(P) = \max\left\{T_1(P), T_2(P), \cdots, T_m(P)\right\}$ [22].

5. Example applications of the evaluation model

5.1. Determination of evaluation indicator weights

5.1.1. G1 method for determining subjective weights. In this paper, 10 experts are first invited to participate in interviews and do questionnaires to determine the mutual influence relationship and importance of the content integration courses of intelligent interaction design and visual communication design education proposed in this paper. According to the experts' scoring, the results of subjective weight calculation are shown in Table 2. As can be seen from the table, the weight values of the four level 1 indicators are similar, among which the weight of external influence is the highest at 0.277, which shows that the experts believe that the overall planning has a strong influence on the effect of the course.

Table 2. Subjective weight result

Primary indicator	Weighting	Secondary indicator	Weighting
(A_1)	0.277	(A_{11})	0.0654
		(A_{12})	0.0385
		(A_{13})	0.0505
(A_2)	0.218	(A_{21})	0.1174
		(A_{22})	0.0285
		(A_{23})	0.046
		(A_{24})	0.1305
		(A_{25})	0.0923
(A_3)	0.273	(A_{31})	0.1381
		(A_{32})	0.0812
(A_4)	0.232	(A_{41})	0.0579
		(A_{42})	0.0847
		(A_{43})	0.069

5.1.2. Determination of objective weights based on the entropy weight method. After data processing and data analysis, the results of the objective index weights of the course evaluation of the integration of intelligent interaction design and visual communication design educational content can be obtained, and the results of the objective weights are shown in Table 3. From the table, it can be obtained that the highest objective weight of educational outcomes is 0.342, which means that the final educational outcomes have a strong influence on the course effect.

Table 3. Objective weight results

Primary indicator	Weighting	Secondary indicator	Weighting
(A_1)	0.2753	(A_{11})	0.0853
		(A_{12})	0.076
		(A_{13})	0.0144
(A_2)	0.1924	(A_{21})	0.0792
		(A_{22})	0.0744
		(A_{23})	0.0871
		(A_{24})	0.0901
		(A_{25})	0.0825
(A_3)	0.342	(A_{31})	0.0631
		(A_{32})	0.0713
(A_4)	0.1903	(A_{41})	0.0867
		(A_{42})	0.0909
		(A_{43})	0.099

5.1.3. Combined weights determined by the combined assignment method. The formula for determining the combined weights according to the combined weighting method leads to the results of the weights of the indicator system under the combined weighting method, and the final combined weights obtained are shown in Table 4. Observations show that the results are partly similar and partly significantly different when using the combined weighting method and calculating the indicator weights individually. This study combines the results from these two methods to improve the accuracy of the indicator weights.

Table 4. The resulting aggregate weight results

Primary indicator	Primary index weight (subjectivity)	Secondary indicator	Secondary index weight	Subjective weight	Objective weight	Composite weight
(A_1)	0.232	(A_{11})	0.1103	0.0154	0.0953	0.0813
		(A_{12})	0.129	0.0378	0.1762	0.0956
		(A_{13})	0.0997	0.0305	0.062	0.0684
(A_2)	0.218	(A_{21})	0.1119	0.0184	0.0392	0.0612
		(A_{22})	0.1017	0.02	0.0704	0.0794
		(A_{23})	0.1078	0.146	0.0871	0.0701
		(A_{24})	0.1286	0.1305	0.0905	0.0876
		(A_{25})	0.011	0.0923	0.0574	0.07
(A_3)	0.273	(A_{31})	0.0462	0.1231	0.0531	0.0801
		(A_{32})	0.0538	0.0612	0.07	0.0993
(A_4)	0.277	(A_{41})	0.0236	0.0588	0.0696	0.0705
		(A_{42})	0.0395	0.187	0.0609	0.0739
		(A_{43})	0.0369	0.079	0.0683	0.0626

5.2. Example analysis

This paper takes school A as an example to carry out empirical research, and sends out questionnaires to relevant experts and scholars who are familiar with this area. Subsequently, the weighted fuzzy logic reasoning method is used to determine the weight of each evaluation index of teaching level of school A. Through the questionnaire, combined with the weight of each index, the evaluation table of teaching level of school A is obtained.The evaluation of teaching level of school A is shown in Table 5.The value of the comprehensive rating of teaching level of school A is 85.362 (points). According to the results of reasoning and calculation, it is known that the comprehensive rating of teaching level of school A is excellent. It can be concluded that the teaching effect of intelligent interaction design and visual communication design courses is good and recognized.

Table 5. A school teaching level evaluation

Primary indicator	Secondary indicator	Evaluation dimension				
		Superior	Good	General	Bad	Very bad
(A_1)	(A_{11})	0.4	0.467	0.133	0	0
	(A_{12})	0.6	0.267	0.133	0	0
	(A_{13})	0.333	0.467	0.2	0	0
(A_2)	(A_{21})	0.433	0.5	0.067	0	0
	(A_{22})	0.467	0.4	0.133	0	0
	(A_{23})	0.6	0.267	0.133	0	0
	(A_{24})	0.333	0.267	0.4	0	0
	(A_{25})	0.377	0.323	0.3	0	0
(A_3)	(A_{31})	0.247	0.469	0.284	0	0
	(A_{32})	0.451	0.373	0.176	0	0
(A_4)	(A_{41})	0.36	0.472	0.168	0	0
	(A_{42})	0.347	0.505	0.148	0	0
	(A_{43})	0.349	0.405	0.246	0	0

5.3. *Analysis of factors affecting teaching effectiveness*

5.3.1. Data collection. In this paper, students of a school were selected as the survey object, and open-ended questionnaire survey method was used for data collection. A total of 300 questionnaires were distributed, and 265 valid questionnaires were screened out, with an effective rate of 88.3%. The questions involve 6 aspects of learning interest, curriculum, faculty, teaching content, practical activities, and teaching effect. Among them, the comprehensive final grade of software engineering courses is used as the index to measure the teaching effect. The factors involved in the questionnaire and the assigned values are shown in Table 6.

Table 6. The factors and the valuation involved in the questionnaire

Definition symbol	Name	Valuation
Y	Teaching effect	Below 60=1,60~70=2,70~80=3,80~90=4,More than 90=5
X_1	Study interest	Completely uninterested=1,No interest =2,Not necessarily=3,Interested in=4,Total interest=5
X_2	Course setting	Completely unreasonable=1,Out of line=2,Not necessarily=3,Reasonable=4,Perfectly reasonable=5
X_3	Faculty	Very weak=1,Weak=2,Not necessarily=3,Strong=40,Very strong== 5
X_4	Teaching content	Very unrich=1,Inabundance=2,Not necessarily=3,Rich=4,Very rich=5
X_5	Practical activity	Very unrich=1,Inabundance=2,Not necessarily=3,Rich=4,Very rich=5

5.3.2. Statistical analysis:

1) Pearson correlation analysis. The results of Pearson correlation analysis are shown in Table 7 (**The correlation is significant when the confidence level (two-tailed) is 0.01). From the table, we can

see that the Pearson correlation coefficient between “learning interest” and “teaching effectiveness”, for example, is 0.932, i.e., |r|=0.932. Therefore, it can be concluded that the learning interest, curriculum, faculty, teaching content, practical activities and teaching effectiveness are significantly correlated with the learning interest, curriculum, teaching content, practical activities and teaching effectiveness, teaching content, practical activities and teaching effectiveness are all significantly correlated.

Table 7. Pearson related analysis results

		Study interest	Course setting	Faculty	Teaching content	Practical activity	Teaching effect
Teaching effect	Pearson correlation	0.932**	0.915**	0.918**	0.879**	0.933**	1
	Significance (double tail)	0.000	0.000	0.000	0.000	0.000	0.000

2) Multiple linear regression analysis. The model is summarized in Table 8. From the table, it can be seen that R denotes the goodness of fit, which is used to measure how well the estimated model fits the observations. The closer its value is to 1 indicates that the model is better. The adjusted R^2 is a little more accurate than the pre-adjusted R^2, and the final adjusted R^2 in the figure is 0.931, which indicates that the independent variable explains a total of 93.6% of the variation in the dependent variable. When doing linear regression to test the independence of the residuals, Durbin-Watson is 2.012, when the DW value is closer to 2, there is also no correlation between the residual terms, so it means that the residuals are independent.

Table 8. Model summary

Model	R	R^2	Adjusted R^2	Standard error	Durbin-Watson(U)
1	0.966*	0.936	0.931	0.3775	2.012

The ANOVA results are shown in Table 9. The table can be seen that the F-value is 608.953, which is the overall test of the entire regression equation, the corresponding p-value is the sig in the table is of great significance, and the table p=0.00<0.05 indicates that the original hypothesis is supported, which means that the linear regression equation is significant.

Table 9. Analysis of variance analysis

Model 1	Sum of squares	Freedom	Mean square	F	Significance
Regression	432.512	5	87.521	608.953	0.000[b]
Residual error	32.493	223	0.153		
Total	465.005	228			

Coefficient α is shown in Table 10. The results show that the tolerance of all five independent variables is greater than 0.14 while the VIF is less than 10. Therefore, it is considered that there is no covariance between the five independent variables, and the multiple linear regression analysis can be carried out directly. The significance levels of the t-tests in the table are all less than 0.05, indicating that the independent variables have a significant effect on the dependent variable. From this analyzing process, the result of this experiment is quite satisfactory. Meanwhile, the regression model can be listed:

$$Y=0.29X_1+0.197X_2+0.162X_3+0.047X_4+0.405X_5-0.289 \tag{19}$$

Through the regression model, it can be clearly seen that all five factors, namely, learning interest, curriculum, faculty, teaching content, and practical activities, are significantly and positively correlated with teaching effectiveness, with the faculty team and practical activities having the greatest influence.

Table 10. The coefficient of α

Model	Nonnormalized coefficient		Standard coefficient	t	Significance	Common linear statistics	
	B	Standard error	beta			admissible	VIF
Constants	-0.289	0.084	--	-4.004	0.000	--	--
Study interest	0.29	0.048	0.324	5.65	0.000	0.117	9.179
Course setting	0.197	0.05	0.179	3.507	0.003	0.148	7.27
Faculty	0.162	0.046	0.133	2.66	0.006	0.104	8.38
Teaching content	0.047	0.07	0.042	0.897	0.021	0.173	5.655
Practical activity	0.405	0.047	0.369	6.969	0.000	0.081	9.223

6. Conclusion

In order to meet the social demand for high-quality talents specialized in intelligent interaction design, this paper presents an in-depth analysis of the intelligent interaction design and visual communication design course, and evaluates the teaching effect of the course through fuzzy logic reasoning algorithm.

Using the fuzzy logic reasoning algorithm to realize a more objective effect evaluation. After evaluating the teaching level of School A, it is found that the comprehensive rating of the teaching level of School A is 85.362, and the comprehensive rating of the level is excellent. From this, it can be concluded that the teaching effect of intelligent interaction design and visual communication design courses is good.

Through the regression analysis method, the regression model can be derived as follows: $Y=0.29X_1+0.197X_2+0.162X_3+0.047X_4+0.405X_5-0.289$, learning interest, curriculum, faculty strength, teaching content, and practical activities have significant positive correlation with the teaching effect, among which the faculty team and practical activities have the greatest influence on the teaching effect.

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