

## Research Article

# The Impact of Teachers' Instructional Design on the Development of Young Children's Sense of Innovation: An Algorithmic Perspective Analysis

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In the development of education, each new technology applied to the teaching process provides a new dimension of development in line with human needs. In national education, intelligent network teaching plays a role in promoting education informatization, education reform, and the smooth implementation of new curriculum standards, and the quality of education technology is an essential part of the quality structure of teachers and helps to optimize teaching and training innovative talents. Genetic algorithms play an important role in the design of intelligent network teaching systems, so the application of genetic algorithms is of great importance to the development of national education in China. The purpose of the design is to cultivate children's interest and enthusiasm in computer technology from an early age and to form a preliminary understanding of computer technology. In recent years, with the popularity of computers and smart phones, the wave of information technology has accelerated in China. Early childhood IT teaching should be combined with the characteristics of the subject and the special understanding characteristics of the elementary school student group, to help students develop their abilities through technological innovation. This thesis starts from the characteristics of multimedia technology. Combined with the process of teaching design, several thoughts are given on how the teaching design based on multimedia technology can be more scientific and reasonable, hoping to be helpful to the pedagogues.

## 1. Introduction

In the information age, the daily use of computer technology has become extremely widespread, and computer science and technology, as a discipline that keeps pace with the times, has strong practical application characteristics. The education for young children must give full play to the subjective initiative, combining the frontier knowledge of the discipline and the mainstream market for teaching. Algorithm design and analysis (hereinafter referred to as algorithm) are considered core in the field of modern computer science, which teaches various solutions to practical problems in computer applications and the basic principles, methods, and techniques of various algorithms, emphasizing programming skills, reasonable data organization, and clear and efficient algorithms, which are

comprehensive, theoretical, and practical and are easier to achieve in the teaching process to keep up with the times. It is easier to combine the cutting-edge knowledge of disciplines and mainstream market.

Kindergarten education work has a special demand for multimedia technology. As young children do not have enough accumulated knowledge, they often need to display teaching resources in a graphic and animated way, which requires the digital processing of traditional teaching resources. Database technology is the best solution to store different file types of teaching resources. The unified storage of teaching resources enables the unified management of teaching resources and the sharing of teaching resource data among teachers, which greatly improves the circulation of data resources. The application of database technology to kindergarten teaching can maximize the efficiency of

teachers' access to teaching resources, optimize the teaching mode, help in adapting to the learning needs of kindergarten-aged students, and improve teaching efficiency.

*1.1. Overview of Innovation Consciousness.* Innovation consciousness is the ideology and spirit of courageous pioneering and continuous exploration that people show in the process of pursuing new things cognitively according to their needs. In the innovation activity, innovation consciousness is the basis of innovation activity; moreover, it is where the power of innovation activity lies [1]. In the present era, innovation consciousness is elevated to a kind of spirit, i.e., innovation spirit, which guides the subject in the pursuit of new things; is a kind of positive, courageous exploration, not resting on the status quo; and is a kind of innovation for the self, which is the development of human self-awareness. Innovative consciousness and innovative ability are like "two wheels of a car and two wings of a bird", which determine the development process of innovation. The basic content of innovation consciousness: innovation motivation is the internal motivation of the subject in innovation activities [2]. It is the highest level of motivation of the subject in the innovation process, and it is the root of accomplishing the innovation goal.

Creative interest is a prerequisite for people to develop creative and innovative consciousness in engaging in creative activities, and people have to make an intrinsic convergent choice of the goals achieved by innovation. Therefore, when cultivating innovative interest in young students, it is important to stimulate and protect students' curiosity and desire for knowledge, while strengthening their knowledge structure, as well as their correct outlook on life, high moral values, and sense of social responsibility. Creative thinking is the top priority when developing students' sense of innovation [3]. Innovative thinking is the thinking process of abandoning traditional stereotypical thinking, daring to question authority and original methods, and using a new way of thinking to develop original and novel solutions to problems through research and reasoning.

*1.2. Instructional Design.* Instructional design, also known as instructional systems design, aims to facilitate learning by systematically arranging instructional processes and resources to create a variety of effective instructional systems. However, due to different life and research backgrounds and life experiences, researchers involved in this discipline often interpret instructional design from different perspectives, so the meanings of instructional design are not all the same, and many different understandings have been generated, as shown in Figure 1.

Through the comparative analysis of published works and articles on instructional design at home and abroad [4], it can be found that researchers have different perspectives and focuses on the definition of the concept of instructional design, which can be roughly divided into the following three aspects: firstly, the process theory, the meaning of which is that instructional design is the planning and elaboration of the whole teaching process, emphasizing the

description of the teaching process rather than other aspects of instructional design. Among them, China's education scholar Professor Umeena believes that instructional design is the process of identifying teaching problems, designing teaching objectives, formulating teaching programs to solve teaching problems, trying out the programs, evaluating the trial results, and continuously improving the original programs according to the trial results [5]. Secondly, the method theory, which focuses on the purpose and meaning of instructional design, believes that instructional design is a systematic approach to study the teaching system, teaching process, and teaching plan, aiming at optimizing the teaching process, and various activities are aimed at getting the most suitable methods and these most suitable methods can enhance students' knowledge and ability. Finally, there is the technology theory, which emphasizes the need to define the meaning by tapping into the essence of instructional design, a modern teaching technique that aims to enhance the planning and rationalization of teaching and learning activities. Through the comparative analysis of these definitions, this study concludes that instructional design is a process of specific planning of teaching objectives, teaching methods, teaching process, and teaching evaluation based on theories of teaching and learning based on a systematic approach according to the training objectives, which is not only theoretical but also extremely practical and applied.

*1.3. Research on Genetic Algorithm-Based Classification Algorithm.* Genetic algorithms are search algorithms based on natural selection and population inheritance mechanisms that simulate the reproduction, hybridization, and mutation phenomena involved in natural selection and natural inheritance. When a problem is solved using a genetic algorithm, each possible solution to the problem is encoded as a "colored body", i.e., an individual, if the individuals form a population. Genetic algorithm is a method to search for optimal solutions by simulating the biological evolution of nature, as shown in Figure 2. It was first proposed by John Holland of the University of Michigan and is usually used to solve optimization and search problems. Genetic algorithms belong to one of a large class of evolutionary algorithms, and similar algorithms include particle swarm algorithms, artificial fish swarm algorithms, and differential evolution algorithms. Similar to other evolutionary algorithms, genetic algorithms encode the problem into different individuals, transforming the original problem and forming a population of many individuals. There are many ways of encoding, such as binary encoding, real encoding, Gray code encoding, and symbolic encoding. After determining the individual coding, we also need to design different adaptation value functions according to different problems and measure the advantages and disadvantages of different individuals by calculating the adaptation value of each individual. After determining the individual coding method and the adaptation value function, the basic operation flow of the genetic algorithm and the related introduction are as follows. (1) Initialization: initialize the population. (2) Individual evaluation: calculate the fitness value of individuals in the

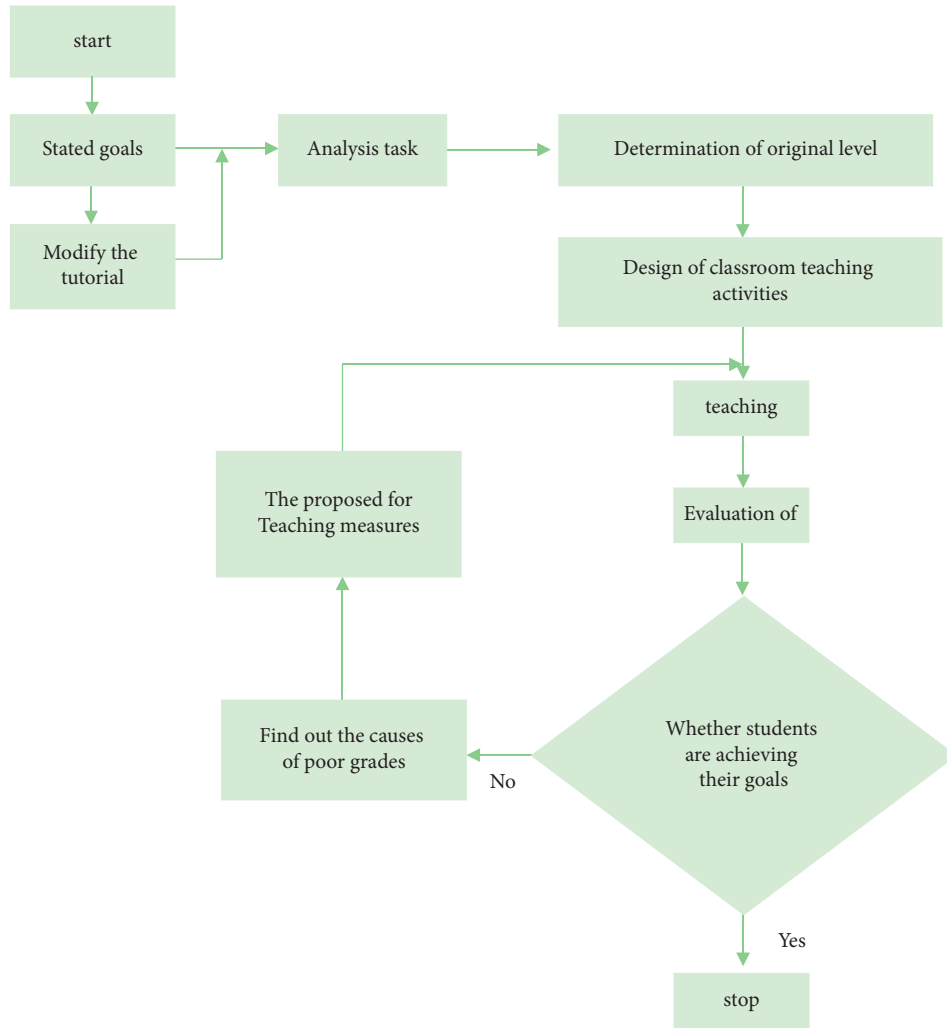


FIGURE 1: Instructional design pattern diagram.

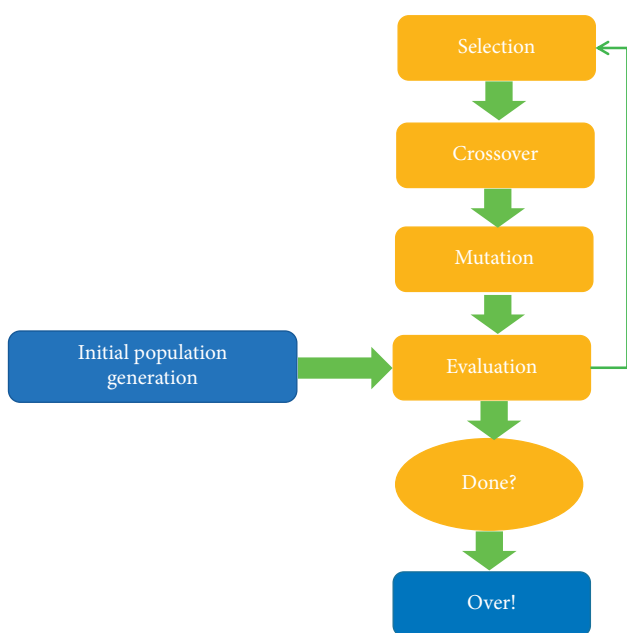


FIGURE 2: Genetic algorithm working principle.

population based on the fitness value function. (3) Selection operation: the selection operator is used to act on the population. The selection operator mimics the principles of survival of the fittest and survival of the fittest in nature’s biological evolution and can be used to determine which individuals in the population will be retained for the next generation or to determine which individuals will undergo crossover and mutation operations. The design of selection operators is based on individual fitness values and is commonly used in roulette wheel algorithms, fitness scaling methods, and local selection methods.

**2. State of the Art**

*2.1. Algorithm Visualization Teaching Design.* The algorithm visualization basic element development library is located at the bottom of the AI algorithm visualization design architecture [6]. The basic element development library is mainly a collection of functions with high reusability, which mainly designs functions for some basic visualization elements that are used frequently and designs API call interfaces for the intermediate processing layer to call. In the algorithm

visualization design, specification 1 requires the use of simple, common, and easy-to-understand basic graphical elements for the design of algorithm visualization. The algorithm visualization basic element development library is based on this guideline for some common basic graphical elements for function design package and visualization development library internal design as shown in Figure 3.

The library of basic elements for algorithmic visualization consists of three modules: Visual Object module, Visual Effects module, and Visual Events module, as shown in Figure 4. The Visual Object module focuses on the design of some common visualization elements, such as lines, circles, rectangles, rings, text, and other basic visualization elements. The Visual Effects module contains the design of some basic visual change effects, such as moving, connecting, highlighting, setting text, deleting, etc. The Visual Events module mainly deals with the effects of basic visual elements listening to the addition and deletion of events.

*2.2. Research on Teachers' Instructional Design.* Relevant foreign studies have divided instructional design into five levels [7]. Each of these levels includes goal setting, information sources, and standards. The annual design and semester-level design are done by the state and schools, and the unit design, week design, and classroom-level instructional design are done by teachers themselves as shown in Figure 5.

In instructional design, teachers have a dual identity as instructional designers on the one hand and pedagogical practitioners on the other [8]. While the primary role of the teacher is that of an instructional designer, it cannot be ignored that the teacher is also a pedagogical practitioner and an expert in the subject matter of teaching. This study focused on the design of teachers' unit educational activity levels and the design of specific educational activity levels.

Because of these multiple roles, teachers' instructional design activities have the following characteristics: compared with the instructional design of full-time instructional designers, teachers' instructional design activities have higher relevance and flexibility. Teachers have a stronger sense of efficacy in instructional design than full-time instructional designers. Teachers' understanding of instructional design is more practical and comprehensive than that of full-time instructional designers.

*2.3. Problems in Early Childhood Literature Education Activities.* The main function of early childhood literature education should be to focus on the cultivation of young children's aesthetics, but research has found that many kindergarten literature education has some problems. According to Jimbo [9], "the main value of literary works depends on the literary charm of the works, which is the carrier to derive the functions of moral education and intellectual education, but kindergarten literature education for young children is biased towards moral education and intellectual education, ignoring the value of aesthetic education and neglecting to let young children feel the beauty of the works . . ." The value of aesthetic education is as follows.

1. Aesthetic education can expand students' intellectual horizons and develop their intelligence and creative spirit.
2. It has the educational function of purifying the mind, cultivating sentiment, and improving moral character.
3. It can promote the development of students' physical fitness and has the value of improving the health and artistry of physical beauty.
4. It helps students to establish the viewpoint of labor and the formation of skills and has the value of technical aesthetics.

She believes that knowledge education and moral education in literature education are indispensable, but the essential function of literature education is not education [10]. In Ren Jimin's "Current Misconceptions in Early Childhood Literature Appreciation Education," it is argued that current early childhood literature education has not received sufficient attention, and it is believed that the main misconceptions in kindergarten literature education include ignoring the subject position of young children's appreciation, belittling the cultivation of young children's aesthetic perception, ignoring the cultivation of young children's aesthetic emotions, and not helping young children to establish a correct aesthetic attitude. There is a belief that kindergarten literature education focuses on knowledge and moral education but does not highlight literature emotional education and aesthetic education [11].

### 3. Methodology

#### 3.1. Research Framework Based on GE-ELM Algorithm

*3.1.1. GE-ELM Algorithm Framework.* In GE-ELM, we first need to encode the random parameters in the ELM to optimize it using the evolutionary framework of the GA algorithm [12]. For an ELM network with N hidden layer nodes, we encode the random parameters in this way as follows:

$$o_i = t + \varepsilon_i, \quad (1)$$

where  $o_i$  is the individual in the GA algorithm, and  $t$  and  $\varepsilon_i$  are the corresponding random parameters of the ELM with an initial range of  $[-1, 1]$ .

The smaller the training error of the network and the smaller the network weight parametrization, the better the generalization ability of the network. We ranked the different individuals by their numerical parametric size and selected the subset of networks with smaller network weight parameters for integration, as in Figure 6.

It was suggested that using a simple averaging method for integration rather than taking different weights for each integrated individual has the advantage of avoiding the overfitting problem [13]. Therefore, in GE-ELM, we simply average the predictions of each selected ELM network to obtain the final experimental results. In solving the classification problem, the category with the highest number of votes is selected as the category to which the sample belongs. For example, when using the  $i$ th ELM network to predict a sample, the samples all have a vector  $v$  with the same dimension and number of classes. If the  $i$ th ELM network predicts that the sample belongs to the  $k$ -th category, the  $k$ -th element of the vector  $v_i$  is set to 1; otherwise, it is set to

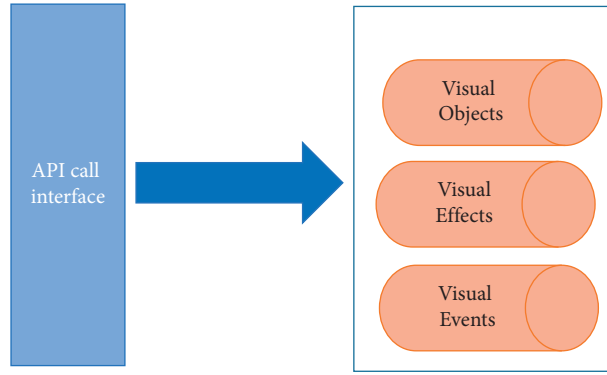


FIGURE 3: Design of algorithm visualization basic element development library.

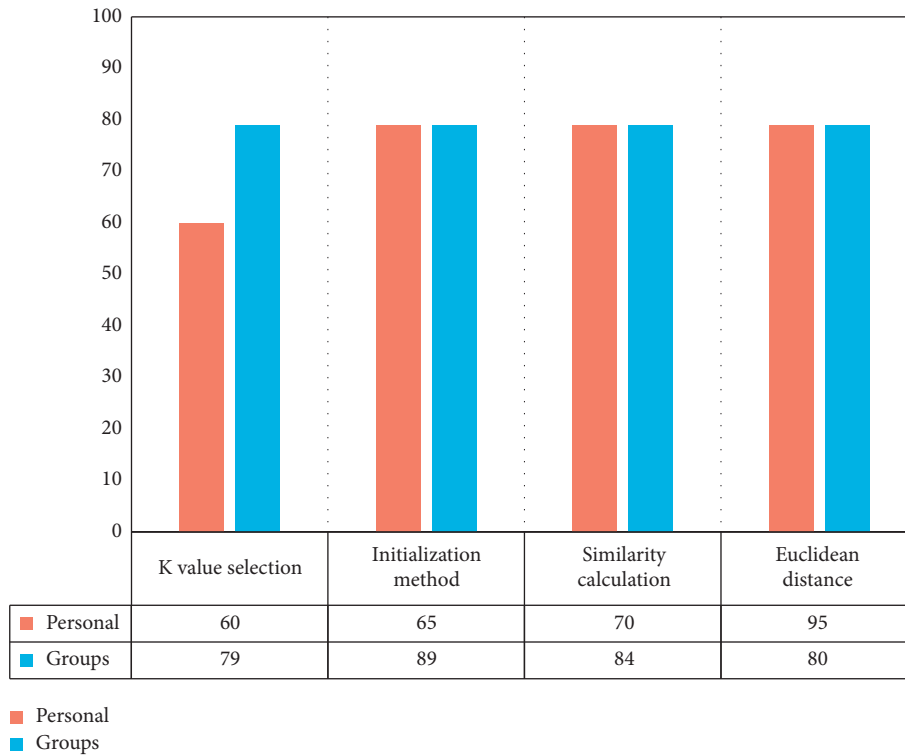


FIGURE 4: Individual versus group learning.

O. After all the ELM networks have predicted a sample, the corresponding decision vector  $V$  for that sample is

$$V_e = \sum_{i=1}^M V_{i.} \quad (2)$$

3.1.2. *Three-Tier Architecture.* The three-tier/multitier distributed computing architecture has undoubtedly become the dominant model for today’s enterprise applications [14]. Any software system can be divided into three layers at the application logic level, from top to bottom: representation layer or user interface layer (UIL), business logic layer (BLL), and data access layer (DAL), as shown in Figure 7.

- (1) The representation layer provides the (UI) of the application [15]. The main function is to receive and return user requests on the client side and only display the data processing results, not the specific data processing. The representation layer of most applications is constructed from forms, and the representation layer is the only part of the application that is visible to the user. The representation layer consists of a series of page forms, each of which contains a variety of fields for collecting user input and displaying output from the lower layers.
- (2) The BLL is in the middle of the DAL and the UIL, also called the middle layer, and is where the user’s business requests at the representation layer are handled and the requested data operations are sent to

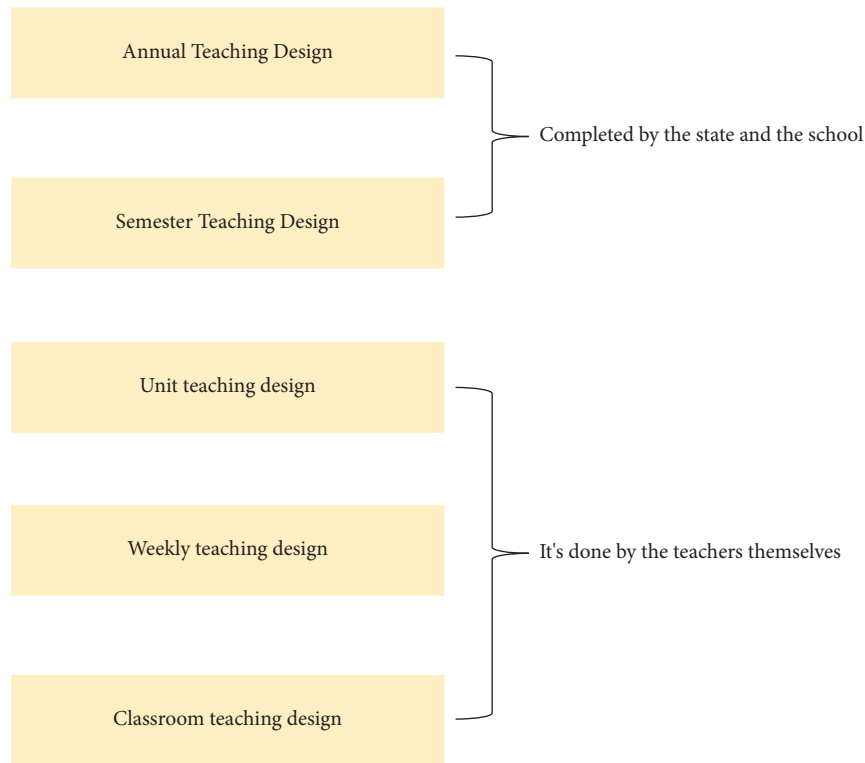


FIGURE 5: The level of foreign teaching design.

the data access layer. It must protect the integrity of the data in the application by implementing business rules. If the DAL is the building block, the logic layer is the construction of those blocks.

- (3) The DAL is the layer that operates on the raw data (database or text files). This layer involves a variety of database access technologies and has one main function. One is to pass the raw data from the database to the BLL, specifically to provide data services for the business logic layer and the representation layer; the other is to parse the operation requests from the business logic layer and convert them into specific data operation commands to pass to the database to complete the execution of query, insert, modify, store, delete, and other operations on the raw data.

**3.2. System Database Design.** The personalized teaching PCAI platform system needs to store basic static information of teachers and students, as well as information related to the operation of the workflow process [16]. The main database tables in the system include teacher information table, student information table, learning activity data table, learning resource data table, role definition data table, and member definition data table. The specific design is as follows.

- (1) Teacher information data table: it mainly stores the basic information of the teachers in the process of online personalized teaching, and students will know

the teachers through these data. The specific design is shown in Table 1.

- (2) Student information data table: it is mainly to store the information data of the student participants in the process of personalized teaching on the Internet, through which the basic information of students can be obtained. The specific design is shown in Table 2.
- (3) Learning activity data table: it records the basic information and dynamic information of learning activities related to the network personalized teaching, including the participants, interactive information content, personalized teaching resources content, and other fields. The specific design is shown in Table 3.
- (4) Learning resources data table: it records the learning contents assigned to different students, the specific learning contents are built in XML format documents, and the records in the learning resources data table indicate the participant objects assigned to the different contents. The specific data table structure is shown in Table 4.

**3.3. Design of the Adaptation Algorithm.** The prototype of the adaptive web-based teaching system (shown in Figure 8) can be divided into three layers: concept layer, relation layer, and user view layer.

The conceptual layer is the physical layer used to store “ideas” [17]. The act of learning is the perception of ideas, which may contain very simple concepts, or they may be

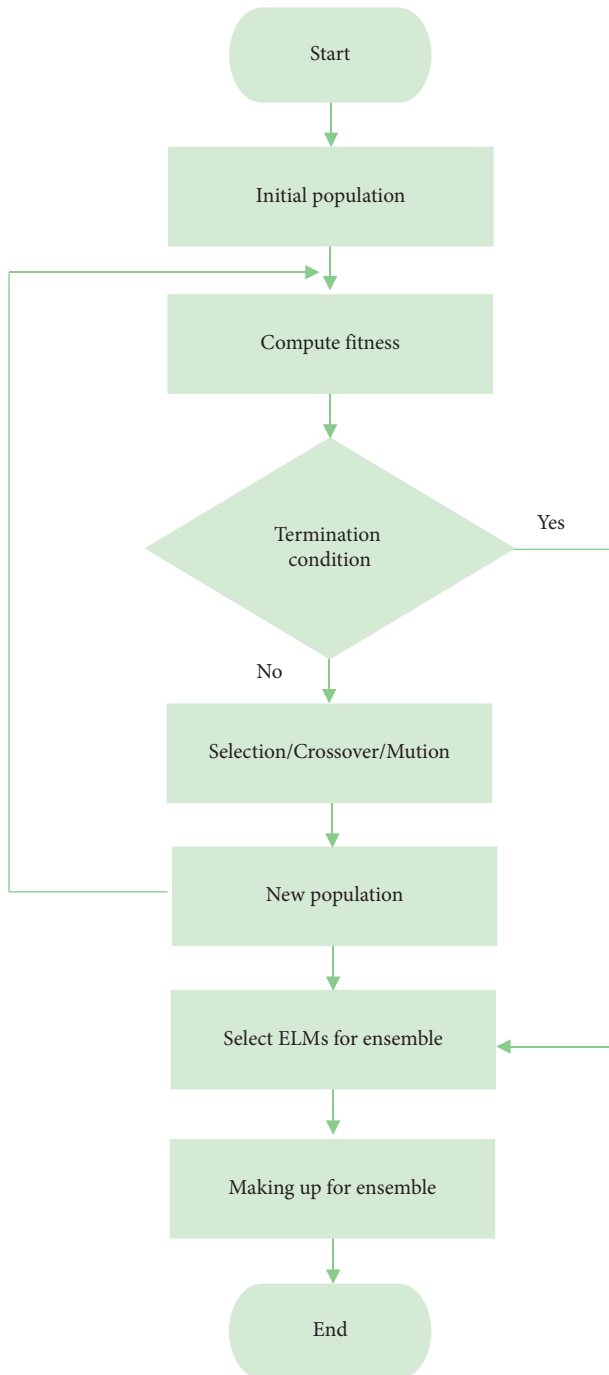


FIGURE 6: Algorithm block diagram of GE-ELM.

compound ideas by organizing and applying multiple ideas. The relational layer is defined as the causal relationship in a Bayesian network. The preconditions of the idea are used to define who is the parent node, and the content of the conditional probability table is also the joint probability distribution of each random variable in the Bayesian network. In this context, units of knowledge and compound ideas seem conceptually similar, but the difference is one of “need”; e.g., for elementary school students, addition, subtraction, multiplication, and division would be separated into four ideas, but for secondary school students, these four

ideas might be combined into a unit of knowledge called a quadratic operation. Appropriate choices can make the generic learning paths simpler, and from a Bayesian network perspective, a simpler network structure is more efficient in terms of computational processing. The relational layer is used to describe the relationship between concepts. The desired concept or composite concept is extracted from the concept layer and defined as a knowledge unit by adding a layer to produce a common learning path. In the user view layer, the generic learning paths generated in the second layer are compared with the learner’s user profile file, and then adaptive learning paths are generated for different learners [18].

3.4. *Teaching Aid System Foreground.* (1) Competition counseling: the administrator can not only release the competition news of related software competitions around the world but also release the competition-related counseling resources for students to download. The competition tutoring module also includes the release of information about related club activities. (2) Java platform: upload teaching materials of Java-related courses, such as Java course, JSP course, and JavaEE course, for students to learn online. (3) Database platform: upload the materials of database direction courses, where the database is usually SQL server course or Oracle course teaching resources for students to learn online [19]. (4) Online question: after students successfully log in to the teaching support system, they can select the designated instructor and ask questions they encounter in the learning process. After the instructor logs into the system, he/she can see the questions sent by students to him/her and answer them online. Net platform and database courses are uploaded in the format of SWF files which cannot be downloaded or copied. At the same time, the system has a search function, so students can search for the resources they need according to their needs. The frontend user case diagram is shown in Figure 9. (5) Learning forum: the most important feature of the teaching aid system is the interaction between teachers and students and peers. Therefore, in the learning forums, the moderators of each forum are full-time instructors. The foreground of the learning forum includes user login management, user registration management, post management, and other functions.

3.5. *Classical Measurement Analysis.* Performance analysis is an analysis of the mean score and score dispersion of an exam. The mean score is the most commonly used concentration measure. The arithmetic mean is the most commonly used and is usually expressed as  $a$ .

$$\bar{a} = \frac{a1 + a2 + \dots + an}{n}, \tag{3}$$

where  $a1, a2, \dots$ , all denote the scores of  $n$  students in a particular test and  $a$  is the arithmetic mean of the test. The variance and standard deviation are the most used, and the larger the standard deviation, the greater the dispersion of

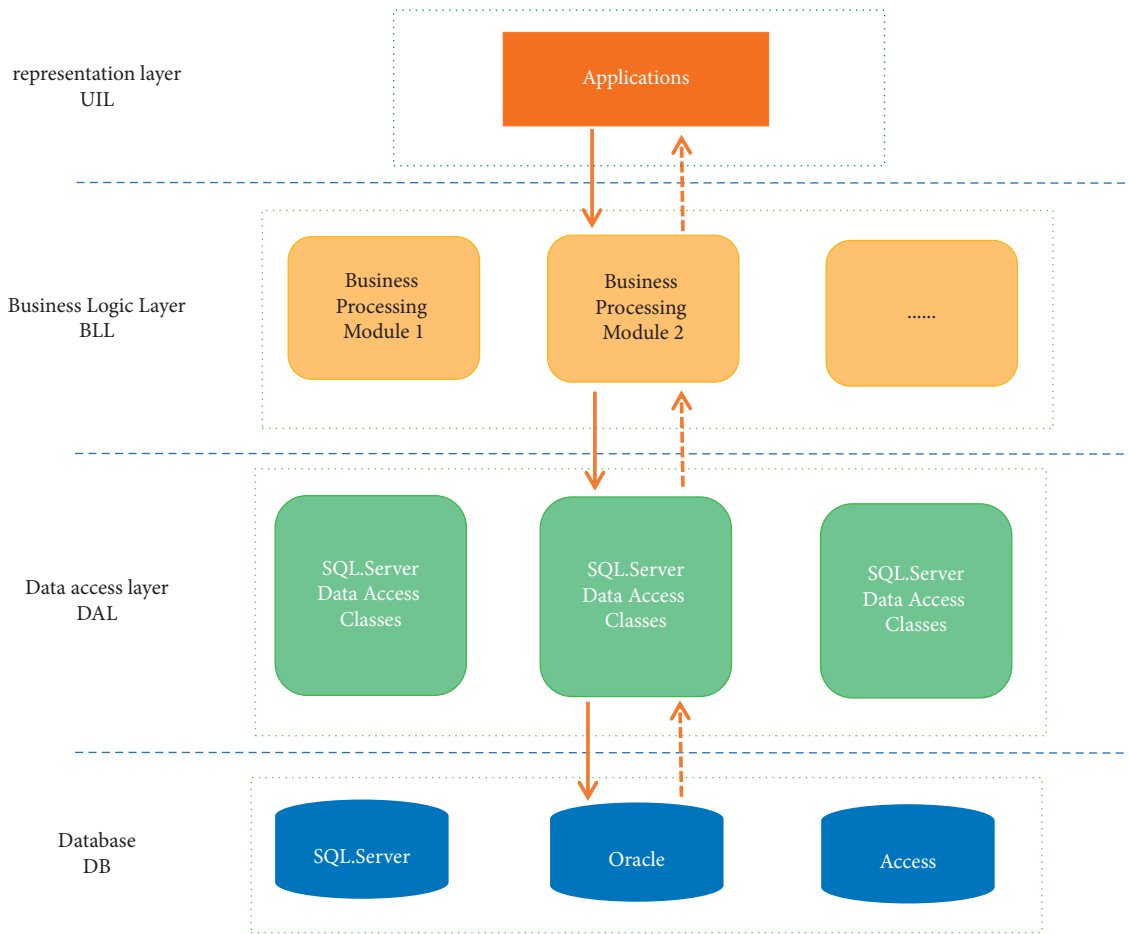


FIGURE 7: Three-tier architecture.

TABLE 1: Teacher information data sheet.

The serial number	The field names	The field type	The length of the field	The name of the field
1	ID	int	8	Teacher ID no.
2	Name	nChar	10	The name
3	Birthday	Date time	8	Birthday
4	Sex	nChar	4	Gender
5	Profession	nChar	50	Professional
6	Level	nChar	10	Job title
7	Educational	nChar	10	Level of education

TABLE 2: Student information data sheet.

The serial number	The field names	The field type	The length of the field	The name of the field
1	ID	int	8	Student ID no.
2	Name	nChar	10	The name
3	Birthday	Date time	8	Birthday
4	Sex	nChar	4	Gender
5	Profession	nChar	50	Professional
6	InSchool	Date time	8	Admission date



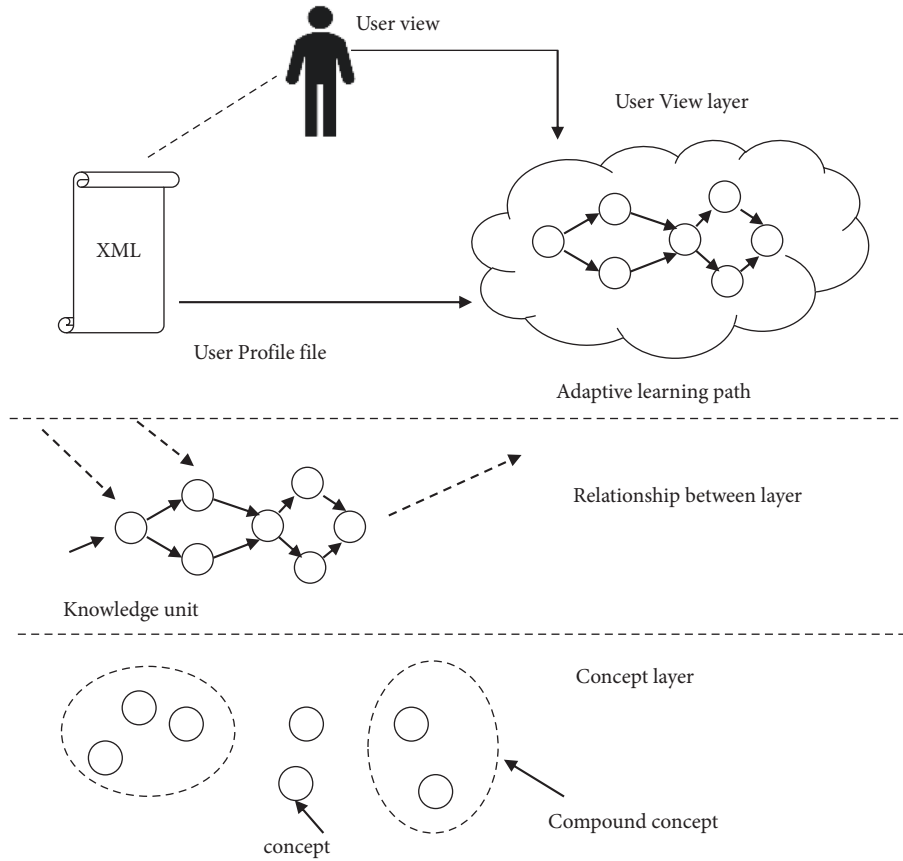


FIGURE 8: Schematic diagram of adaptive network teaching system prototype.

TABLE 3: Learning activity data sheet.

Serial number	Field name	Field type	Field length	Remarks
1	ID	int	8	Learning activity ID
2	Attends ID	nChar	100	Participant number
3	Messages	int	8	Interaction information ID
4	Teach resource	int	8	Personalized teaching resources ID
5	Time node	Date time	8	Time nodes

TABLE 4: Learning resources data sheet.

Serial number	Field name	Field type	Field length	Remarks
1	ID	int	8	Learning resource ID
2	Level	int	8	Resource level
3	Profession	nClar	16	Areas of expertise
4	Attendes ID	int	8	Participant ID
5	Update time	Date time	8	Update time
6	File ID	int	8	Study material index

the scores. If there are  $n$  students with scores  $a_1, a_2, \dots, a_n$ ,  $\bar{a}$  is their mean score, and  $S^2$  represents the variance, then

$$S^2 = \frac{1}{n} \sum_{i=1}^n (a_i - \bar{a})^2. \quad (4)$$

The standard deviation obtained by squaring the variance is

$$S = \sqrt{\frac{1}{n} \sum_{i=1}^n (a_i - \bar{a})^2}. \quad (5)$$

In addition to the analysis of test scores, it also includes the analysis of the difficulty of the whole test thesis or test questions. Difficulty analysis: the difficulty of a test question

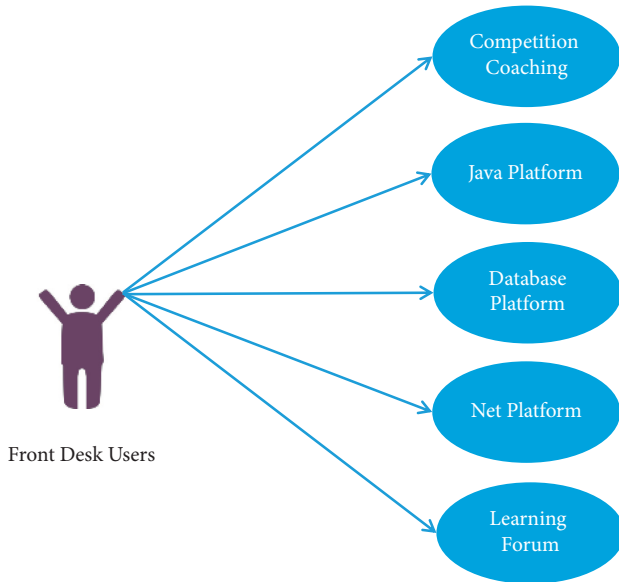


FIGURE 9: Frontend user example diagram.

is an indicator of how easy it is for candidates to answer the question. The difficulty value of the test question is expressed by the examinee's loss rate of the test question. The higher the loss rate, the greater the difficulty. The commonly used method to determine the difficulty of test questions is to use the following formula:

$$d_i = 1 - \frac{\bar{p}_i}{m_i}. \quad (6)$$

## 4. Result Analysis and Discussion

**4.1. Experimental Results Analysis of MVSC Algorithm and Comparison Algorithm.** In this subsection, we give the performance of different single-view and multiview algorithms on the above four data, and in Table 5 we give the relevant experimental results based on the foot evaluation criteria, including the mean and standard deviation. By analyzing the correlation results in Table 5, we can draw the following conclusions.

In the SVM-based single-view algorithm, the experimental results of SVM AU, which uses all viewpoint data as the training set, are more accurate in all four datasets than the SVM algorithm (SVM TYPE  $x$ ), which is trained using only one viewpoint data information. The training dataset of SVM ALL contains richer information than that of a single perspective data, which indicates that the classification accuracy of the model can be improved by using richer information. When comparing SVM AU with the multiview algorithm, also using all viewpoint data, we found that the multiview algorithm can obtain better experimental results, which also indicates that effective fusion of viewpoint features can further improve the model performance. For example, in the Nus.wIDE.OBJEcT dataset, the best result achieved by the single-view algorithm is  $0.187 \pm 0.018$ , while the lowest experimental result among all multiview learning

algorithms is  $0.190 \pm 0.019$ , which is slightly higher than that achieved by the single-view SVM AU algorithm, while MVSC achieves the highest experimental precision of  $0.309 \pm 0.019$  in this dataset. Experimental precision of  $0.309 \pm 0.008$  is much higher than the experimental results obtained with the SVM All algorithm.

**4.2. Systematic Teaching Effect Analysis.** The early childhood thinking education system provides a set of software based on modern digital technology and inductive touch technology for the teaching of young children's innovative education, integrating a variety of teaching elements of teaching interaction, experience, entertainment, and education. Teaching materials are placed in the experience table mode, and children participate in games through touch and induction, fully mobilizing their learning interest and initiative in contact with physical teaching tools and cognitive animation images. It has a significant pedagogical and educational effect on children's perception, observation ability, memory level, imagination, numerical comparison, classification, matching, sorting, judgment, reasoning, etc., as well as the formation of concepts of foot power, shape, number, color, plane and three-dimension, space, and correspondence, which encourage children to observe and experience the world independently, positively, and happily in multiple levels. In summary, this system has many positive effects for both young children and their parents, as shown in Figure 10.

- (1) The early childhood thinking education system can stimulate the desire of young children to explore actively. The games in the early childhood thinking education system are some images that are very suitable for kindergarten-age children, such as common fruits and bright colors, which meet the age characteristics of kindergarten children aged 3–6 and are very stimulating to young children's senses. The computer system, on the other hand, is composed of a number of games, which are the most important way for children under 6 years old to receive information, and these games are played with children's favorite anime images as the main characters, which fully stimulate children's desire and behavior of active exploration and positive thinking while mobilizing their multiple senses and create a relaxed and pleasant mood and atmosphere for the activity process of children.
- (2) The Early Childhood Thinking Education System can increase children's methods of inquiry. The goal of early childhood education is for children to master the concept of simple numbers; learn to add and subtract within 10 operations; master geometric figures, bodies, time, space, and other knowledge; develop calculation and projection skills; and develop mathematical thinking. The main starting point of the game is the concepts of shape, number, plane and three dimensions, space, and correspondence, which coincides with the development goals

TABLE 5: Experimental results of MVSC algorithm and comparison algorithm.

Methods	NUS-WIDE	Scene	MSRC-v1	Digit
SVM (Type1)	0.161 ± 0.016	0.830 ± 0.018	0.786 ± 0.026	0.964 ± 0.023
SVM (Type2)	0.152 ± 0.018	0.743 ± 0.015	0.774 ± 0.022	0.764 ± 0.021
SVM (Type3)	0.144 ± 0.020	0.665 ± 0.017	0.794 ± 0.021	0.958 ± 0.023
SVM (Type4)	0.153 ± 0.019	0.581 ± 0.019	0.798 ± 0.019	0.798 ± 0.026

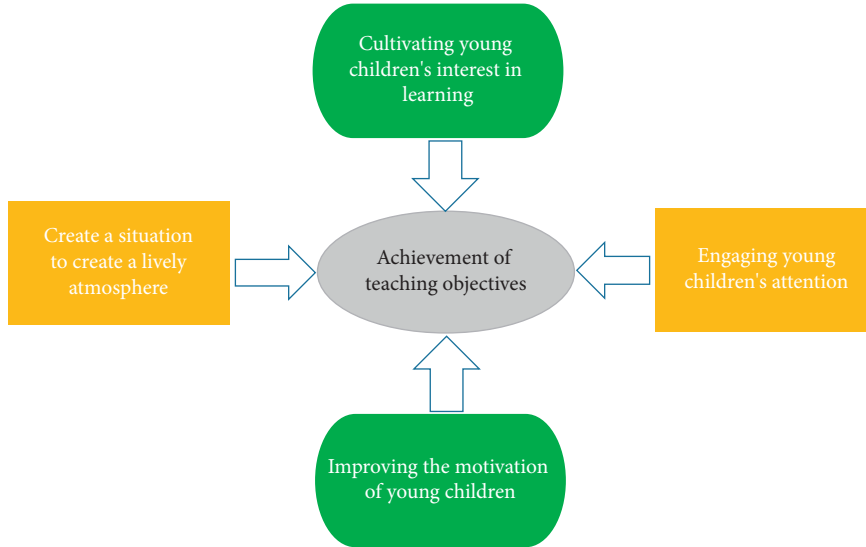


FIGURE 10: Program for the development of young children’s sense of innovation.

of kindergarten science. In the form of games, it can be divided into tabletop games, computer games, and touchpad games, so that children have to use different ways in order to complete the game, so in the activity, children can get more and more ways to explore the problem.

- (3) The early childhood thinking education system can enhance children’s sense of accomplishment in problem solving. The various games in the system are divided into three levels, different levels are adapted to different developmental levels of children, and the cloud storage included in the system can analyze and archive each operation of children. This happens so that instructors and parents can more clearly understand the development trend of children and choose the level of difficulty to adapt to, in order for children to be able, after a certain amount of thinking, to solve problems and get the sense of accomplishment of exploring the world and solving their doubts.

4.3. Teaching Strategies on Developing a Sense of Innovation

4.3.1. Treat the Results of Students’ Thinking Well. In the daily teaching process, the teacher’s attitude will largely affect the students’ emotions after their innovation [20]. It just does not accurately represent reality, and knowledge can be a summary and generalization of daily experience, which does not mean that knowledge is the truth. Knowledge is not

static, but it changes with the progress of society. If teachers are not willing to listen to students’ different opinions and suggestions, then this behavior will greatly frustrate students’ motivation to think independently and inhibit the development of creative thinking. When a teacher is faced with a student’s wrong question, he or she should analyze the reasonableness of such thinking and not simply dismiss it or even punish the student.

4.3.2. Strengthen Thinking Training and Stimulate Innovation. The specific meaning of trying to find different ways of thinking is that there are open questions that do not have fixed answers, so that we can think in many different directions in response to the question. In order to achieve the goal of developing innovative thinking, one can try to train students to think about the problem from different levels and not always be limited by the inherent patterns of thinking. The goal of innovative thinking will also eventually agree at some level with the rest of the inherent thinking, but its main manifestations are oppositional [20]. Conducting open-ended teaching can lead children to overcome their inherent thinking patterns, look at problems from different perspectives, think and analyze from both sides of things, and thus get different views. This way of teaching is conducive to promoting the development of children’s innovative thinking, allowing children to further sublimate their understanding of knowledge, enhancing students’ enjoyment of learning and fostering innovative thinking.

4.4. *Exploring the Design of Algorithm Visualization Development Library.* In the process of designing the data structure visualization library, a comprehensive consideration of the problem should be made, in which JVDSCl is mainly an extension of the original data structure class based on the Java collection library, and at the same time, the corresponding more complex data structure is added in the process: the most common is the tree diagram. In JVDSCl process, the visual data structure is constructed to realize the visualization of the data structure, and this visual data structure is also based on the operation of the original data structure class in the Java collection library, in addition to adding some visual properties and providing the visualization interface. Each data structure has multiple display modes, which requires developers to choose organically, and in JVDSCl, there are multiple layout methods for each data structure to lay out.

In addition, in the layout design, the key issue about the visualization of data structures is the layout of graphics, which has a very close relationship with the researchers' understanding of the effect of data structures and algorithms. The most important in JVDSCl is the linear layout method and the graph layout method, and the implementation of the algorithm is different for each different layout. The basic algorithm framework of the linear layout method is to obtain the number of elements of data and to calculate the size of the layout based on the displayed size and the number of data elements.

## 5. Conclusion

Computer multimedia technology in early childhood teaching is welcomed and favored by teachers, which is a new trend of early childhood teaching reform. The scientific and effective use of computer multimedia technology can help stimulate children's interest in learning and mobilize their enthusiasm for participation; help improve children's understanding and enrich their knowledge reserves; and help cultivate children's comprehensive ability and promote their all-round development. Therefore, the effective application of computer multimedia technology in the teaching of early childhood teachers has become a necessity. In order to give full play to the advantages of computer multimedia technology, teachers should start from the following three aspects. Firstly, use computer multimedia technology to create a situation to quickly focus the attention of young children; secondly, make full use of computer multimedia technology to do high-quality courseware to play the role of half the effort; and finally, use the combination of computer multimedia technology and traditional technology to have a good effect on the strengths and weaknesses of the common role.

In conclusion, multimedia technology for kindergarten teaching is a new teaching tool highlighted in the curriculum reform, which is very attractive and infectious to young children and can effectively promote the cognitive and emotional development of young children. Further, kindergarten teachers in teaching practice should strive to develop, explore, and study how to use multimedia technology appropriately.

## Data Availability

The labeled dataset used to support the findings of this study can be obtained from the corresponding author upon request.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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