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Retraction

Retracted: System Construction of Mind Map in English Vocabulary Teaching Based on Machine Learning Algorithm

Mobile Information Systems

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] X. Zhao, "System Construction of Mind Map in English Vocabulary Teaching Based on Machine Learning Algorithm," *Mobile Information Systems*, vol. 2022, Article ID 7775528, 11 pages, 2022.

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Research Article

System Construction of Mind Map in English Vocabulary Teaching Based on Machine Learning Algorithm

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Mind map is an effective graphical thinking tool for expressing divergent thinking. It is a simple, yet effective and efficient, practical thinking tool. This paper aims to use machine learning algorithms to build a mind map system and apply it to English vocabulary teaching. This paper first introduces the classification of machine learning algorithms and then briefly expounds the overview of the mind map construction system. Finally, this paper integrates the mind map constructed by machine learning algorithms into English vocabulary teaching practice and compares it with the traditional teaching mode. The experimental results show that the accuracy rate of students' vocabulary review and test under the vision of the English vocabulary teaching mode of the mind map constructed by the machine learning algorithm has reached 85%, which verifies the effectiveness of the method. Popularizing it in the current English vocabulary teaching can improve students' interest and effect in learning vocabulary and has certain operability.

1. Introduction

With the update of science and technology and the progress of the times, the society has higher requirements for the improvement of the level of education and teaching development. Education and teaching need to change the traditional single teaching strategy and teaching mode, continue to reform and innovate, cater to the characteristics of the development of the times, and develop in the direction of diversification. As one of the important components of English teaching requirements, students' mastery of English vocabulary has always been the main focus of cultivating students' practical spirit and learning comprehension ability. However, in contrast to the current English vocabulary teaching, most schools adopt the traditional teaching mode and lack the establishment of a scientific system of vocabulary knowledge and the students' interest in learning is relatively low. Mind mapping is a way of learning thinking that was proposed in the second half of the 20th century. Because of its many advantages, it is widely used in many fields, such as business cooperation, corporate marketing, scientific research, and other fields. It can be seen from time to time even in daily study and work life. Using it in English vocabulary teaching practice and knowledge review can not only improve students' enthusiasm for learning English but also improve their ability to master more English vocabulary. However, it is difficult to extract key points from such a huge vocabulary system and effectively analyze, simplify, and summarize vocabulary knowledge points to form a comprehensive and effective thinking system, only relying on manual labor. And it takes a long time, which invisibly adds pressure and burden to teachers. Therefore, the algorithm technology that can automatically construct the mind map system is very important for English vocabulary teaching.

At the same time, machine learning algorithms have been developed and have breakthroughs in various important fields. The integration of machine learning algorithms, education, and teaching has gradually begun to be tried. Teaching practice based on machine learning algorithms has become a breakthrough point for reform and innovation in the field of education. Applying machine learning algorithms to the system construction of mind maps in English vocabulary teaching can liberate teachers' hands to a great extent and reduce the time cost due to huge workload. It enables English teachers to shift their focus to teaching practice and improve teaching quality and efficiency. The mind maps constructed by machine learning algorithms are not inferior to manual work and can even integrate knowledge more comprehensively, which is also of great help and guidance for students' vocabulary learning. At present, there are few studies on the construction of mind mapping system. This paper proposes a novel research direction of English vocabulary teaching, based on machine learning algorithm. This technology can effectively make an accurate generalization of the English vocabulary system, which provides a perfect and improved development suggestion for the education and teaching industry and can also provide new ideas for the research in the field of English teaching. The research framework of this paper is shown in Figure 1.

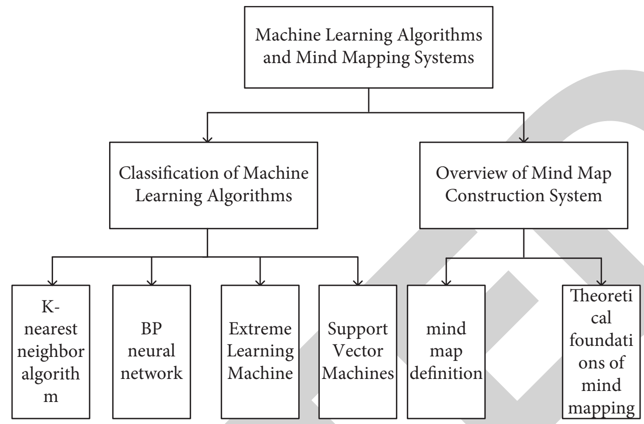

Figure 1: The research framework of this paper.

2. Related Work

In recent years, many scholars have carried out research on machine learning algorithms. In his article, Wei introduced the application of machine learning algorithms in the industrial field and discussed the development and challenges of deep learning in future industrial applications. He believes that the essence of machine learning algorithms is to build a multilevel machine learning architecture that can be trained on large-scale data [1]. In order to improve the quality and efficiency of the software, Zhang and Jiang analyzed and summarized the machine learning model, the modifications involved in the model, and the application effect for the automatic generation of the program. His research is explored from two aspects of programmer behavior and machine learning automatic program generation [2]. Chang et al. proposed a pulmonary nodule identification algorithm based on machine learning, finally carried out the algorithm construction experiment on the cooperative hospital dataset, and compared it with 8 advanced algorithms on the public dataset LUNA16. The final experimental results show that the proposed algorithm can improve the accuracy of pulmonary nodule recognition and can reduce the missed detection of nodules [3]. Sarkar et al. used an optimized machine learning algorithm to predict the outcome of accidents such as injuries, near misses, and property damage using occupational accident data and finally validated the effectiveness of the proposed method through experiments [4]. Kavakiotis et al. conducted a systematic review of the application of machine learning and data mining techniques in diabetes research. They believe that the application of machine learning algorithms in biological science is very important because it can intelligently transform all available information into valuable knowledge [5]. Khan et al. provided a comprehensive review of the contributions made by the field of feedforward neural networks (FNNs) in machine learning algorithms to improve their generalization performance and convergence speed (learning speed). They explore and examine the broad application of FNN algorithms to solving real-world management, engineering, and health science problems, demonstrating the advantages of these algorithms in enhancing real-world operational decision-making [6]. In summary, after several years of exploration, the application of machine learning algorithms has been deeply studied by many scholars, but there are not many studies on the construction of mind map systems in English vocabulary teaching. The research in this paper can provide a new direction for English research on machine learning algorithms and can also provide certain ideas for English vocabulary teaching and promote the development of teaching intelligence. Therefore, in order to further promote the development of English teaching, the practical research on the construction of English vocabulary mind map system from the perspective of machine learning algorithm is urgent.

3. Machine Learning Algorithm and Mind Mapping System

3.1. Classification of Machine Learning Algorithms. Machine learning is theoretically a method of empowering machine learning so that machines can use experience to improve their performance. In a practical sense, it is a method of training a model from a data set and then using the model to predict the results. There are four common machine learning algorithms, as shown in Table 1: K-nearest neighbor algorithm, BP neural network, extreme learning machine, and support vector machine.

3.1.1. K-Nearest Neighbor Algorithm. The K-nearest neighbor method was proposed by scholars in the second half of the 1960s to search for a sample data with the highest degree of correlation and similarity in a wide feature space and integrate and classify these similar sample data. Its model is shown in Figure 2. In the current research field, it is generally used as a problem scenario for sample classification, but in fact, it can also be used to process and analyze regression problems. The K-nearest neighbor algorithm aims to search for a sample with the highest degree of correlation and similarity with the data features contained in the detection sample and uses this as the result to output training data [7].

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Table 1: Common machine learning algorithms and features.

Sequence	Algorithm	Feature
1	K-nearest neighbor algorithm	Partitioning the feature space
2	BP neural network	Clear model, simple structure, and small amount of calculation
3	Extreme learning machine	The weights of the hidden layer nodes do not need to be updated, and the learning process only calculates the output weights
4	Support vector machines	Empirical and structural risk

To determine the training samples with the highest similarity with the test samples, the distance needs to be measured, that is, the distance between the training samples is calculated, and the distance here can be represented in various forms. Suppose the sample has n features and the feature vector of the ith sample is $x_i = (x_i^{(1)}, x_i^{(2)}, \cdots, x_i^{(n)})^T$; then, the feature space is the n-dimensional real vector space R^n. For $x_i = (x_i^{(1)}, x_i^{(2)}, \cdots, x_i^{(n)})^T$, $x_j = (x_j^{(1)}, x_j^{(2)}, \cdots, x_j^{(n)})^T$, x_i, and x_j, the L distance is defined as

$$L_p(x_i, x_j) = \left(\sum_{l=1}^{n} \left|x_i^{(l)} - x_j^{(l)}\right|^p\right)^{(1/p)}. \tag{1}$$

Among them, $P \geq 1$, when $P = 1$ is the Euclidean distance [8]:

$$L_2(x_i, x_j) = \left(\sum_{l=1}^{n} \left|x_i^{(l)} - x_j^{(l)}\right|^2\right)^{(1/2)}. \tag{2}$$

In the scenario of solving the classification problem, we can set the type of the sample to be m class. Then, the first sample among the samples of m classes is denoted as $y_i = (y_1, y_2, \cdots y_m)^T$, and the k training sample fields with the highest similarity with the test sample are set as $N_k(x)$. Then, among them, the k training sample categories that account for the majority are the final output categories of the test samples, which can be expressed as [9] in the formula as follows:

$$y = \arg\max_{y_j} \sum_{x_i \in N_k(x)} I(y_i = y_j), i = 1, 2 \cdots n; j = 1, 2, \cdots m. \tag{3}$$

For the regression problem, let the label of the ith sample be a continuous value of y_i, and the neighborhood covering the k nearest samples is denoted as $N_k(x)$. Then, the final output of the test sample is determined by the average value of the k training samples searched in the field, which can be expressed as [10] follows:

$$y = \frac{1}{K} \sum_{x_i \in N_k(x)} y_i, i = 1, 2, \cdots, n. \tag{4}$$

The most important step in the K-nearest neighbor algorithm is the determination of the value. If the value is determined to be small, the approximation error will also be smaller, but the estimation error is different from the approximation error and the estimation error will be larger. If the estimation error is too large, it will easily lead to the overfitting of the sample. Conversely, if the value of k is determined to be a large value, the approximation error will also increase, which will also lead to errors [11]. The K-k nearest neighbor algorithm is also one of the simplest of all machine learning algorithms.

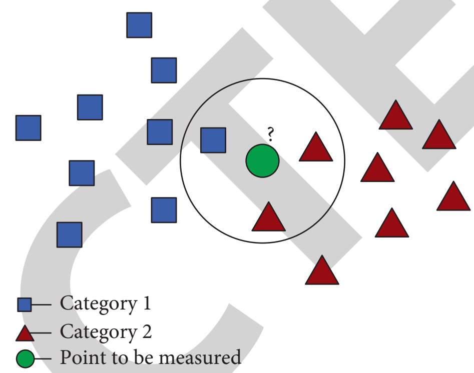

Figure 2: K-nearest neighbor algorithm model.

3.1.2. BP Neural Network. An artificial neural network is an algorithmic model developed on the basis of imitating the neural network organization of the human brain. In the human brain nervous tissue system with 100 neurons, if one neuron is touched, the other hundreds of millions of neurons associated with it will communicate and share brain information through the chemicals it sends. Later, some scholars generalized and abstracted the principle of neurons and formed the M-P neuron network model, as shown in Figure 3:

Let the input received by the neuron be the vector $x = (x_1, x_2, \cdots x_n)^T$ in n-dimensional space. At first, the weight vector $w = (w_1, w_2, \cdots w_n)^T$ received by the neuron needs to be weighted; then, the total input of the neuron is expressed as [12]

$$\Phi = \sum_{i=1}^{n} w_i x_i. \tag{5}$$

Each neuron has a threshold θ, the total input is compared with the threshold and processed by the activation f function, and the output of the neuron is [13]

$$y = f\left(\sum_{i=1}^{n} w_i x_i - \theta\right). \tag{6}$$

There are many modes of activation function, and we choose the most convenient mode; that is, when the input of

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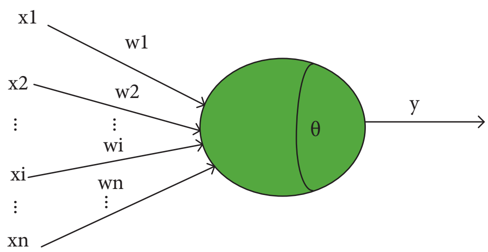

Figure 3: M-P neuron model.

the neuron meets certain conditions of the training scene, the output is 1. If the conditions of the training scenario are not met, the output is 0 and this pattern can also be called a step function, expressed as [14]

$$\operatorname{sgn}(x)\begin{cases}0, & x<0,\\ 1, & x\geq 0.\end{cases} \tag{7}$$

Although the step function is the simplest mode in the activation function, it also has certain limitations. In practical applications, we usually do not use the step function as the activation function and we generally use the sigmoid function as the activation function. Its function image is not much different from that of the tangent function, which is expressed by the following formula [15]:

$$\operatorname{sigmoid}(x)=\frac{1}{1+e^{-x}}. \tag{8}$$

Although artificial neural networks are extremely complex in structure like the human brain, they are fundamentally similar to neuron models. In a neural network, there is often only one input layer and one output layer, but the hidden layer has an infinite number and each layer contains an infinite number of neurons. Each neuron distributed here is also called each node distributed in the neural network, as shown in Figure 4. A single hidden layer neural network, as its name implies, is a neural network with only one hidden layer. The purpose of the neural network is to continuously adjust the weights and thresholds interconnected with the neural network, according to the input training samples until they meet the accuracy required by the test samples. This process of continuous adjustment is the process of continuous learning of the algorithm model [16].

The error backpropagation algorithm makes the error decrease along the gradient direction by adjusting the weights and thresholds of the input node and the hidden layer node, and the hidden layer node and the output node. After repeated learning and training, the network parameters corresponding to the minimum error are determined.

Let the training set samples have n attributes and m labels. That is, for a sample, the attribute vector is $x=(x_1, x_2, \cdots x_n)$ and the label vector is $y=(y_1, y_2, \cdots y_m)$. The corresponding neural network input layer has n nodes, and the output layer has m nodes. As for the hidden layer, for the convenience of explaining the problem, it is assumed here that there is one hidden layer and the number of hidden layer nodes is one.

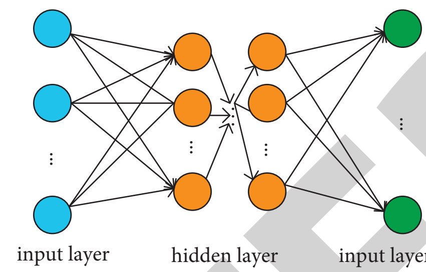

Figure 4: Neural network structure.

Note that the connection weight between the ith node of the input layer and the h-th node of the hidden layer is φ_{ih}, and the threshold of the h-th node of the hidden layer is σ_h. Then, the total input α_h received by the h-th node of the hidden layer is [17]

$$\alpha_h=\sum_{i=1}^{n}\varphi_{ih}x. \tag{9}$$

Then,

$$\beta_j=\sum_{h=1}^{l}\omega_{hj}b_h. \tag{10}$$

The definition of each parameter in formula (10) is shown in Table 2.

For sample 1 in the training set, if the output of the neural network is 2, then

$$y_j=f\left(\beta_j-\theta_j\right), \tag{11}$$

where f is the activation function and θ_j is the threshold of the jth node of the output layer. The mean square error at this time is [18]

$$E=\frac{1}{2}\sum_{j=1}^{m}\left(y_i-y_j\right)^2. \tag{12}$$

Now, we adjust the parameters according to the gradient descent method. An update to an arbitrary parameter v is expressed as [19]

$$v\leftarrow v+\Delta v. \tag{13}$$

If the selected learning rate is η, then for ω_{hj} [20],

$$\Delta\omega_{hj}=-\eta\frac{\partial E}{\partial\omega_{hj}}. \tag{14}$$

And it is easy to know that

$$\frac{\partial E}{\partial\omega_{hj}}=\frac{\partial E}{\partial y_j}\cdot\frac{\partial y_j}{\partial\beta_j}\cdot\frac{\partial\beta_j}{\partial\omega_{hj}}. \tag{15}$$

From formula (10), it is clear that

$$\frac{\partial\beta_j}{\partial\omega_{hj}}=b_h. \tag{16}$$

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Table 2: The meaning of the parameters.

Sequence	Parameter	Paraphrase
1	b_h	The output of the h th node in the hidden layer
2	ω_{hj}	The connection weight between the h th node of the hidden layer and the j th node of the output layer
3	θ_j	Threshold of the j th node of the output layer
4	β_j	The total input received by the j th node of the output layer

When the activation function is a sigmoid function, according to the properties of the sigmoid function, there are [21]

$$f'(x) = f(x)(1 - f(x). \quad (17)$$

Therefore, it can be known from formulas (11)–(16) that

$$\Delta\omega_{hj} = \eta b_h\left(y_i - y_j\right)y_j\left(1 - y_j\right). \quad (18)$$

Let $g_j = (y_i - y_j)y_j(1 - y_j)$; then, formula (17) can be written as

$$\Delta\omega_{hj} = \eta b_h g_j. \quad (19)$$

Similarly [22, 23], the following can be obtained:

$$\Delta\theta_j = -\eta g_j, \quad (20)$$

$$\Delta\varphi_{ih} = \eta e_h x_i, \quad (21)$$

$$\Delta\sigma_h = -\eta e_h. \quad (22)$$

From formulas (21) and (22),

$$e_h = b_h(1 - b_h)\sum_{j=1}^{m}\omega_{hi}g_j. \quad (23)$$

3.1.3. Extreme Learning Machine. Extreme learning machine is a kind of algorithm for a single hidden layer of the neural network in machine learning algorithm. The hidden layer in this algorithm model is only one layer, as shown in Figure 5. The algorithm will randomly generate weights and thresholds that are interconnected with neurons in the training scene, and there is no need to adjust the weights and thresholds by themselves during this process. The extreme learning machine algorithm aims to determine the number of neurons contained in a single hidden layer [24, 25].

3.1.4. Support Vector Machine. The support vector machine algorithm model is often used to deal with classification problems. It aims to draw two straight lines between data nodes to maximize the distance between nodes. Algorithmic models depict data items as points in an n-dimensional space. In this space, n is the number of input data features, and the algorithm model finds the optimal boundary, as shown in Figure 6. The advantage of the SVM algorithm is that it can capture key samples, eliminate a large number of redundant samples, and has better robustness; the disadvantage is that it is difficult to implement large-scale training samples.

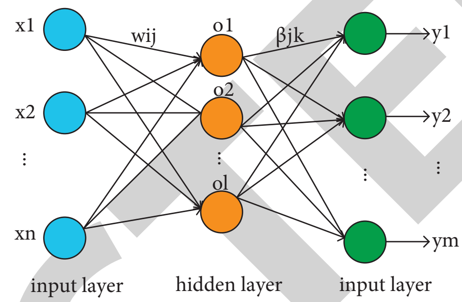

Figure 5: The network structure of extreme learning machine.

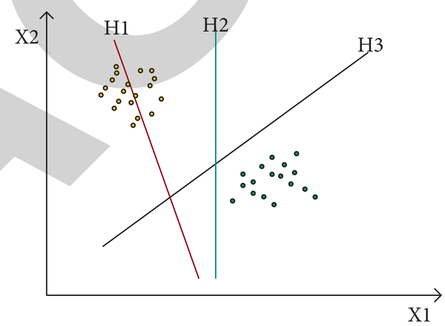

Figure 6: Support vector machine algorithm mode.

3.2. Overview of the Mind Map Construction System

3.2.1. Definition of the Mind Map. Mind mapping was created in the late 1960s. A mind map is a thinking tool for storing, organizing, and optimizing information, which is presented in the form of diagrams or in a network structure, using elements such as keywords, images, or branches. Mind mapping is a revolutionary method to tap the unlimited potential of the brain, a method of learning and memory. It is not only a visual tool to aid memory but also a dynamic and organic review tool, time manager, and memory stimulator.

As a tool for divergent thinking, mind maps should follow certain steps when drawing. The first step is to focus on the core issue or thesis. The second step is to draw an image in the center of the blank paper to represent the core keyword. The third step is to draw outwardly divergent lines based on the central image or core keywords, that is, the main branches of the mind map, Making sure to connect these main branches closely with the central image. The fourth step is to write a keyword related to the theme on each branch to clarify the main idea of the mind map and the nature of the problem to be explored. In the fifth step, on the basis of the main branch, it draws secondary and tertiary branches for related secondary ideas. The secondary branch

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is connected with the main branch, and the tertiary branch is connected with the secondary branch, and so on, as shown in Figure 7. In the process, Lenovo is everything. In the process of drawing a mind map, you can use images, graphics, colors, etc., to modify it to enhance the fun and watchability of the mind map.

The mind map uses the synergy of the left and right brains to reflect the “whole brain” thinking. The synergy of the left and right brains will boost the brain’s logical induction of thinking, which is beneficial to the cultivation of divergent thinking and innovative thinking. At the same time, the mind map combines the traditional paper and pencil form and the computer software drawing methods, and the pictures and texts are vivid. Based on this, mind maps can be widely used in daily learning activities.

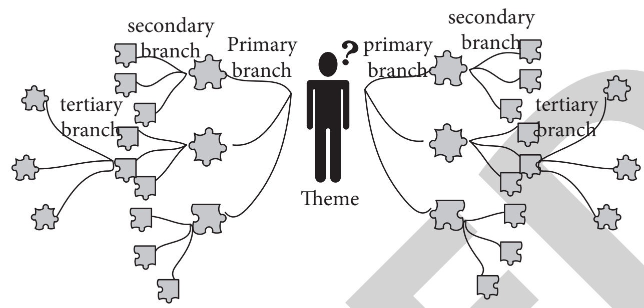

Figure 7: Mind map construction system.

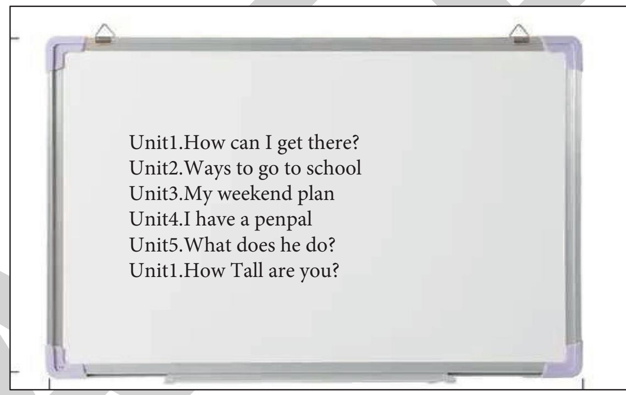

Figure 8: The content of experimental teaching.

3.2.2. The Theoretical Basis for the Application of Mind Maps in English Vocabulary Teaching

(1) Brain Science Theory. Modern brain science research shows that the human brain is composed of about 14 billion neurons. Memory, comprehension, and imagination are determined by the ability to transmit information between neurons [26, 27]. The faster the neural connections in the brain, the quicker the thinking, the easier the neural connections in the brain, and the more innovative the thinking. The brain’s thinking is presented through divergent network images, which provides the physiological basis for human divergence, association, and imagination. Human activities such as thinking, memory, and association are carried out by the coordinated network structure of this system. In recent years, with the continuous deepening of the research on the biophysiology and neurophysiology of the human brain, researchers have found that the potential capacity of the human brain is infinitely huge and the current development of the potential of the human brain is far from enough. With the deepening of the theory of brain science, brain research shows that the human brain is divided into two hemispheres, the left brain and the right brain. The left brain is mainly good at logical thinking, reasoning and analysis, language, numbers, and vocabulary. In daily life, we can find that most people are accustomed to using the right hand, so that the left brain receives more stimulation than the right brain, resulting in more synaptic connections that make the human left brain more developed, while the right brain is relatively idle. The uncoordinated and unbalanced use of the left and right brains reduces human thinking ability. Mind map is based on the theory of brain science. It uses images, colors, lines, and keywords to play the characteristics of left-brain logical thinking and right-brain image thinking to promote “whole brain” coordinated thinking.

(2) Constructivism Theory. Constructivism believes that students’ “acceptance” of knowledge can only be accomplished by their own construction. Therefore, to find new growth points of knowledge in students’ own experience, students should actively construct knowledge [28, 29]. Times are developing, society is progressing, and knowledge is constantly being updated. Constructivism believes that the knowledge possessed by individuals is not static, and the knowledge possessed by individuals should be constantly updated with the development of the times. Mind map in the process of auxiliary teaching well reflects the theory of constructivism. First of all, constructivism emphasizes the subject status of students and takes students as the center. Students use mind maps to take notes, review homework, and plan time, all of which reflect the subjectivity of students. This enables students to have greater sovereignty to manage their study time and to learn and review knowledge in a way that is suitable for individual students. Using mind mapping, students can express their opinions independently and present their thinking process more clearly, and in the process, they can continue to diverge their thinking and improve their imagination. Secondly, constructivism emphasizes the active construction of knowledge by students. To a certain extent, the traditional paper-and-pencil learning method makes students become passive recipients of knowledge and reduces their learning initiative. Mind map emphasizes students’ understanding of knowledge and the initiative of students to draw mind maps. Students draw mind maps according to their own understanding of knowledge. In this process, students complete active construction based on their own understanding of knowledge. Thirdly, constructivism does not ignore the guiding role of teachers in the teaching process, while emphasizing that students actively construct knowledge and maintain their dominant position. Before students have understood and

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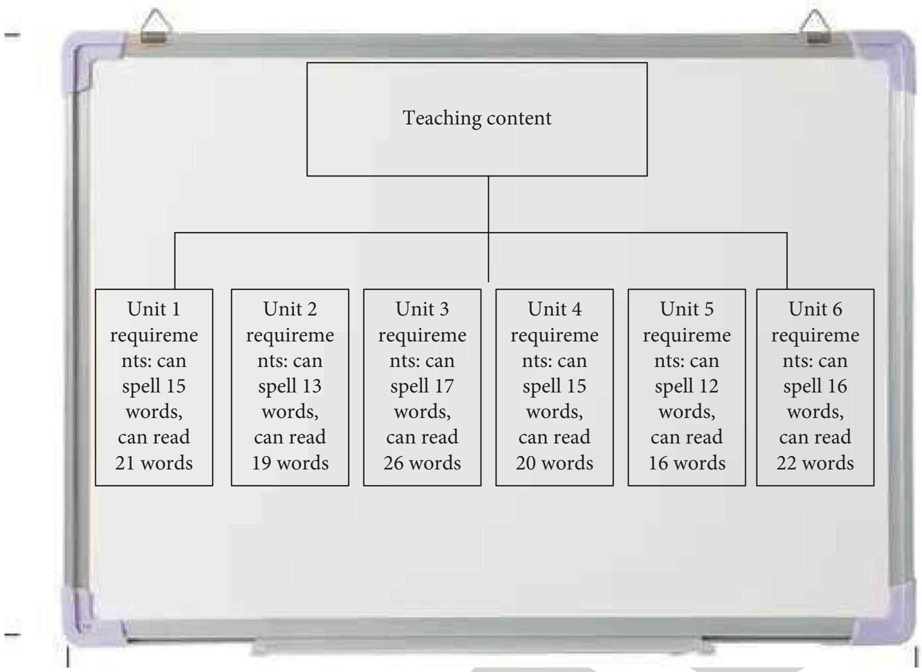

Figure 9: Requirements for experimental teaching.

Table 3: Comprehensive ability of class A students.

Test items	*T* value	*P* value
Intelligence level	−0.141	0.722
Memory level	0.621	0.59
Thinking innovation level	−0.216	0.36

Table 4: Comprehensive ability of class B students.

Test items	*T* value	*P* value
Intelligence level	−0.157	0.579
Memory level	0.411	0.47
Thinking innovation level	−0.276	0.29

mastered the basic knowledge and production methods of mind maps, teachers should guide them for a period of time and make some mind maps to share with students, so as to strengthen students' mastery of mind map drawing skills during the drawing process. Of course, when students draw mind maps, it is inevitable that they are not thoughtful. Teachers should check, modify, and improve the mind maps drawn by students in time and encourage students to optimize the mind maps they draw. In English vocabulary teaching, we can combine constructivism theory with mind map. Mind maps can be used under the guidance of constructivist theory, and how to effectively use mind maps can be analyzed and excavated from various aspects of constructivism, so as to promote students' understanding and mastery of how to use existing experience and knowledge for efficient review.

4. English Vocabulary Teaching Practice

This paper integrates the mind map constructed based on machine learning algorithm into the practice of English vocabulary teaching and tests the students to examine the learning effect of the students [30, 31]. The teaching content and requirements are shown in Figures 8 and 9. Then, it is compared with the traditional teaching method to verify the effectiveness of the method.

In this experiment, students in the sixth grade of a primary school were taken as the experimental objects, the sample size was 50, and they were divided into two classes. Before the experiment was carried out, a comprehensive ability test was conducted on the students of the two classes. The statistical results are shown in Tables 3 and 4:

From Tables 3 and 4, it can be seen that from the perspective of intelligence level, memory level, and thinking innovation level of boys and girls in classes A and B, the *T* values were −0.141, 0.621, and −0.216 and −0.157, 0.411, and −0.276 and the significant level *P* values are all greater than 0.05. It shows that the comprehensive ability of students in the two classes is not significant and the difference is small.

The time span of the teaching experiment in this paper is one semester, and the teaching content consists of 6 knowledge units. During the teaching process, the students' vocabulary learning in each unit is tracked and a learning test survey is conducted after each unit is completed. The statistical results are shown in Figures 10–13.

It can be seen from Figure 10 that the average accuracy rate of vocabulary review by class A students in 6 units of study is 91.33%; the average accuracy rate of vocabulary review by class B students in 6 units of study is 84.73%; the average accuracy rate of students in class A in learning vocabulary identification in 6 units is 83.46%; and the

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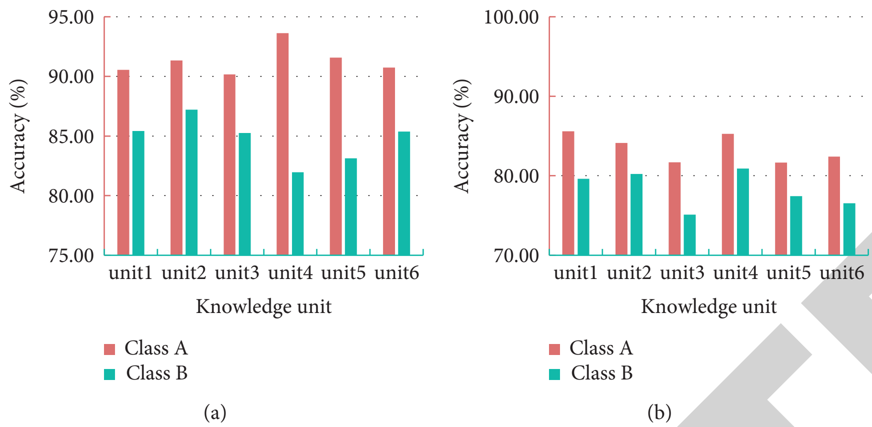

Figure 10: Vocabulary learning accuracy. (a) The accuracy of vocabulary review of students in classes A and B. (b) The accuracy of vocabulary identification and analysis of students in classes A and B.

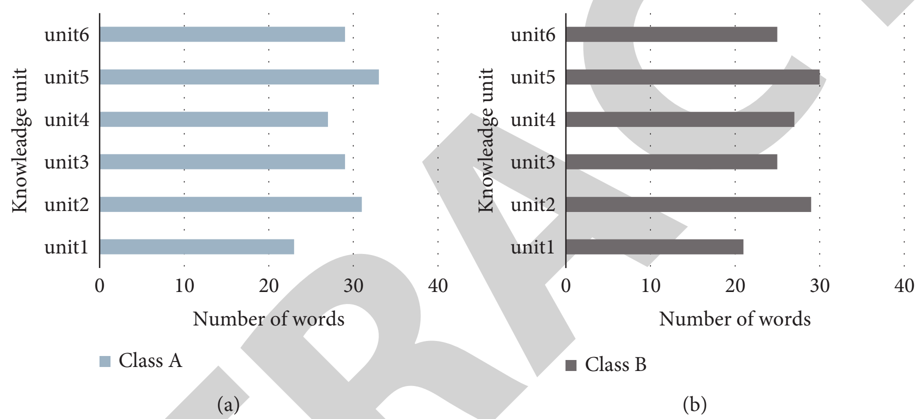

Figure 11: Students' vocabulary mastery. (a) The vocabulary mastery of class A students. (b) The vocabulary mastery of class B students.

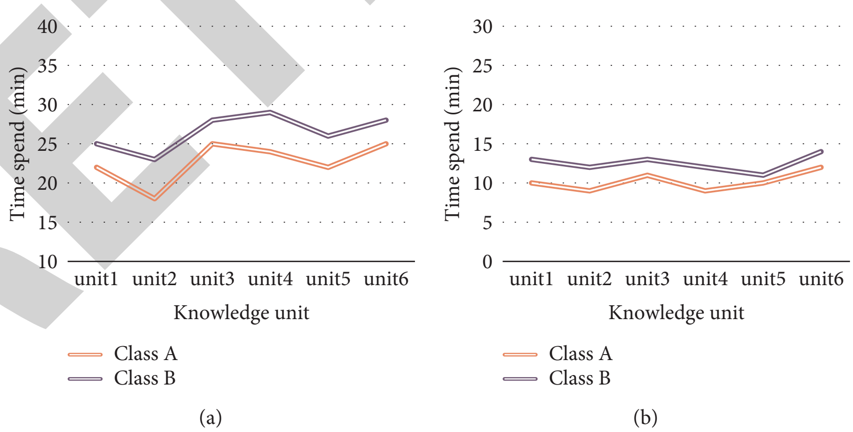

Figure 12: Students learn and review words. (a) The time it takes for students in classes A and B to learn new words. (b) The time spent by students in classes A and B reviewing old words.

average accuracy rate of students in class B in learning vocabulary identification in 6 units is 78.31%.

It can be seen from Figure 11 that students in class A mastered a total of 172 words in 6 units of study and students in class B mastered a total of 157 words in 6 units of study.

It can be seen from Figure 12 that the students in class A spent an average of 22.67 minutes in learning new words per unit and 10.17 minutes in reviewing old words in each unit in the 6 units of study; in the 6 units of study, the students of Class B spent an average of 26.50 minutes learning new words in each unit and the average time spent reviewing each unit of old words was 12.50 minutes.

It can be seen from Figure 13 that the average completion rate of the objective and subjective questions in each unit of

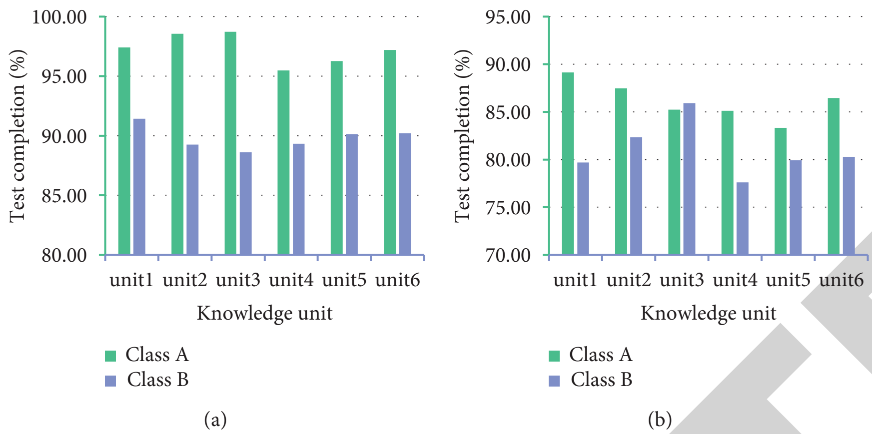

Figure 13: Test completion statistics. (a) The test completion status of students in classes A and B. (b) The test accuracy of students in classes A and B.

the 6 units of study for class A students is 97.27% and the average test accuracy is 86.12%; in the 6 units of study, the average completion rate of objective questions and subjective questions in each unit test of class B students is 89.83% and the average test accuracy is 80.96%.

5. Discussion

Contrasting the experimental data between the English vocabulary teaching mode of the mind map constructed by the machine learning algorithm and the traditional English vocabulary teaching mode, the following conclusions can be drawn:

(1) At the level of English vocabulary learning, the machine learning algorithm builds a mind map in the English vocabulary teaching mode and the comprehensive grasp of students' words is 15 times more than that of the traditional teaching mode [32, 33]. The time spent learning new words is also 3.83 minutes less than the time spent by students learning new words under the traditional teaching model.

(2) At the level of English vocabulary review, the accuracy rate of students' word review and word identification under the perspective of English vocabulary teaching mode constructed by machine learning algorithm is 5.88% higher than that of students' word review and word identification under the perspective of traditional teaching mode and the time spent reviewing old words is 2.33 minutes less than the time students spend learning new words under the traditional teaching model.

(3) At the level of learning outcomes, the completion rate of students' unit tests in the perspective of English vocabulary teaching mode constructed by machine learning algorithm is 7.44% higher than that in the perspective of traditional teaching mode and the test accuracy is 5.16% higher than that of students' unit test under the traditional teaching mode.

The whole comparative experimental data show that under the condition of keeping other experimental conditions the same, after English vocabulary teaching with different teaching modes, no matter in terms of English vocabulary learning, review, or learning outcomes, students under the perspective of the English vocabulary teaching mode constructed by machine learning algorithms showed more superiority [34, 35]. It shows that the mind map system constructed based on machine learning algorithm can effectively improve the teaching effect in English vocabulary teaching, help students memorize words, and enable students to devote themselves to vocabulary learning more deeply. Based on the analysis of the experimental data, we can see that the mind map constructed by incorporating machine learning algorithms into traditional English vocabulary teaching does have certain practical value and significance.

6. Conclusion

The development of economic globalization has made English teaching an important part of the education industry, and the teaching requirements for students' English vocabulary are also extremely strict. Most teachers often use mechanical teaching methods to help students memorize words, but in the long run, it not only fails to deepen students' memory of words but also easily causes students to lose their enthusiasm for learning English. As a new type of knowledge management strategy, mind maps can effectively integrate the key points of knowledge and guide students to memorize vocabulary more scientifically. The mind map system constructed by machine learning algorithm not only has the advantages of low cost but also can analyze and process knowledge points in various ways. This paper applies machine learning algorithm to English vocabulary teaching, which improves students' learning interest and learning effect to a certain extent. The mind map proposed in this paper can effectively improve the quality of teaching. It is believed that with the improvement and advancement of technology, the application of mind maps constructed by

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machine algorithms in English vocabulary teaching will be more and more high quality and high level.

Although, this paper uses machine learning algorithms to conduct in-depth research on the construction of English vocabulary teaching mind maps, there are still many deficiencies. The depth and breadth of the research in this paper are not enough, our academic level research is also limited, and the application research of machine learning algorithms is still in the preliminary stage. In the future work, we will conduct research from more perspectives based on the existing technology and level and continuously improve the quality of the algorithm. In the future research work, the experimental conditions and content will be continuously improved, and the practical value and significance of machine learning algorithms in English vocabulary teaching will be explored from more angles.

Data Availability

No data were used to support this study.

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

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References

[1] Z. Wei, “A summary of research and application of deep learning,” *International Core Journal of Engineering*, vol. 5, no. 9, pp. 167–169, 2019.

[2] X. Zhang and Y. Jiang, “Research and application of machine learning in automatic program generation,” *Chinese Journal of Electronics*, vol. 29, no. 6, pp. 1001–1015, 2020.

[3] J. Chang, Y. Li, and H. Zheng, “Research on key algorithms of the Lung CAD system based on Cascade feature and Hybrid Swarm intelligence optimization for MKL-SVM,” *Computational Intelligence and Neuroscience*, vol. 2021, no. 4, pp. 1–16, 2021.

[4] S. Sarkar, S. Vinay, R. Raj, J. Maiti, and P. Mitra, “Application of optimized machine learning techniques for prediction of occupational accidents,” *Computers & Operations Research*, vol. 106, pp. 210–224, 2018.

[5] I. Kavakiotis, O. Tsave, A. Salifoglou, N. Maglaveras, I. Vlahavas, and I. Chouvarda, “Machine learning and data mining methods in diabetes research,” *Computational and Structural Biotechnology Journal*, vol. 15, pp. 104–116, 2017.

[6] W. A. Khan, S. H. Chung, M. U. Awan, and X. Wen, “Machine learning facilitated business intelligence (Part I),” *Industrial Management & Data Systems*, vol. 120, no. 1, pp. 164–195, 2019.

[7] J. Li, “Application of note onset detection based on constant q transform detection algorithm in music teaching,” *Journal of Mines, Metals and Fuels*, vol. 65, no. 2, pp. 90–93, 2017.

[8] Y. Jiang, “Application of the mind map in learning English vocabulary,” *Open Access Library Journal*, vol. 07, no. 6, pp. 1–4, 2020.

[9] E. Choporova, “Application of Mind Map-based abstracting technique in pedagogical strategy for ESP teaching/learning,” *Journal of Education, Culture and Society*, vol. 5, no. 1, pp. 110–123, 2020.

[10] Y. Ma, “The application of Schema theory in the teaching of English Reading in Senior high schools,” *Region - Educational Research and Reviews*, vol. 3, no. 3, pp. 17–20, 2021.

[11] X. Duan, “The application of activity-based method in English Reading teaching in Senior high school,” *Region - Educational Research and Reviews*, vol. 3, no. 2, pp. 60–64, 2021.

[12] X. Lei, W. Zhang, W. Ni et al., “Recognition of moyamoya disease and its hemorrhagic risk using deep learning algorithms: sourced from retrospective studies,” *Neural Regeneration Research*, vol. 16, no. 05, pp. 830–835, 2021.

[13] P. T. H. Ngo, M. Panahi, K. Khosravi et al., “Evaluation of deep learning algorithms for national scale landslide susceptibility mapping of Iran - ScienceDirect,” *Geoscience Frontiers*, vol. 12, no. 2, pp. 505–519, 2021.

[14] T. Linner, W. Pan, R. Hu et al., “A technology management system for the development of single-task construction robots,” *Construction Innovation*, vol. 20, no. 1, pp. 96–111, 2020.

[15] M. F. Wahid, R. Tafreshi, M. Al-Sowaidi, and R. Langari, “Subject-independent hand Gesture recognition using Normalization and machine learning algorithms,” *Journal of Computational Science*, vol. 27, pp. 69–76, 2018.

[16] S. Raghu and N. Sriraam, “Classification of focal and non-focal EEG signals using neighborhood component analysis and machine learning algorithms,” *Expert Systems with Applications*, vol. 113, pp. 18–32, 2018.

[17] A. Whyte, K. P. Ferentinos, and G. P. Petropoulos, “A new synergistic approach for monitoring wetlands using Sentinels -1 and 2 data with object-based machine learning algorithms,” *Environmental Modelling & Software*, vol. 104, pp. 40–54, 2018.

[18] S. K. A. Ali, F. Parvin, J. Vojteková et al., “GIS-based landslide susceptibility modeling: a comparison between fuzzy multi-criteria and machine learning algorithms,” *Geoscience Frontiers*, vol. 12, no. 2, pp. 857–876, 2021.

[19] H. Lickert, A. Wewer, S. Dittmann, P. Bilge, and F. Dietrich, “Selection of suitable machine learning algorithms for classification Tasks in Reverse Logistics,” *Procedia CIRP*, vol. 96, no. 2, pp. 272–277, 2021.

[20] H. Y. Tsao, P. Y. Chan, and C. Y. Su, “Predicting diabetic retinopathy and identifying interpretable biomedical features using machine learning algorithms,” *BMC Bioinformatics*, vol. 19, no. 9, pp. 283–121, 2018.

[21] L. Liu, Y. Ye, C. Shen, Y. Wang, and R. Erdélyi, “A new tool for CME Arrival time prediction using machine learning algorithms: cat-PUMA,” *The Astrophysical Journal*, vol. 855, no. 2, p. 109, 2018.

[22] M. Esfahanian, N. Erdol, E. Gerstein, and H. Zhuang, “Two-stage detection of north Atlantic right whale upcalls using local binary patterns and machine learning algorithms,” *Applied Acoustics*, vol. 120, pp. 158–166, 2017.

[23] M. Roopaei, P. Rad, and K. Choo, “Cloud of Things in Smart Agriculture: Intelligent Irrigation monitoring by thermal imaging,” *IEEE Cloud Computing*, vol. 4, no. 1, pp. 10–15, 2017.

[24] Y. Cho, S. J. Julier, N. Marquardt, and N. Bianchi-Berthouze, “Robust tracking of respiratory rate in high-dynamic range scenes using mobile thermal imaging,” *Biomedical Optics Express*, vol. 8, no. 10, pp. 4480–4503, 2017.

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[25] A. Rahman and A. D. Smith, "Predicting fuel consumption for commercial buildings with machine learning algorithms," *Energy and Buildings*, vol. 152, pp. 341–358, 2017.

[26] F. T. Al-Dhief, N. Latiff, N. Malik et al., "A survey of Voice Pathology Surveillance systems based on Internet of Things and machine learning algorithms," *IEEE Access*, vol. 8, no. 1, pp. 64514–64533, 2020.

[27] M. M. Gromiha and M. Suwa, "Discrimination of outer membrane proteins using machine learning algorithms," *Proteins: Structure, Function, and Bioinformatics*, vol. 63, no. 4, pp. 1031–1037, 2010.

[28] S. Sengan, P. Vidya Sagar, O. Ibrahim Khalaf, and R. Dhanapal, "The optimization of reconfigured real-time datasets for improving classification performance of machine learning algorithms," *Mathematics in Engineering, Science and Aerospace (MESA)*, vol. 1, 12 pages, 2021.

[29] K. Lee, H. Ko, H. Kim, S. Y. Lee, and J. Choi, "Practical vulnerability analysis of mouse data according to offensive security based on machine learning," *Entropy*, vol. 1184, 2020.

[30] H. Tao, W. Zhao, R. Liu, and M. Kadoch, "Space-air-ground IoT network and related key Technologies," *IEEE Wireless Communications*, vol. 27, pp. 96–104, 2019.

[31] S. Panagiotis, "Neural signatures of attention: insights from decoding population activity patterns," *Frontiers in Bioscience*, vol. 22, no. 1, pp. 221–246, 2018.

[32] W. H. Wang, "Multimodal College English class with Ecology Orientation," *ADV SOC SCI EDUC HUM*, vol. 2017, pp. 101–106, 2017.

[33] T. H. Vemulapalli, S. S. Donkin, T. B. Lescun, P. A. O'Neil, and P. A. Zollner, "Considerations when writing and reviewing a higher education teaching Protocol involving Animals," *Journal of the American Association for Laboratory Animal Science: Journal of the American Association for Laboratory Animal Science*, vol. 56, no. 5, pp. 500–508, 2017.

[34] C. Elsey, A. Challinor, and L. V. Monrouxe, "Patients embodied and as-a-body within bedside teaching encounters: a video ethnographic study," *Advances in Health Sciences Education*, vol. 22, no. 1, pp. 123–146, 2017.

[35] A. K. Shreedhara, S. Shanbhag, R. C. Joseph, and S. K. Varadaraj, "A study of Maternal Breast feeding issues during Early Postnatal Days," *SciMedicine Journal*, vol. 2, no. 4, pp. 219–224, 2020.

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