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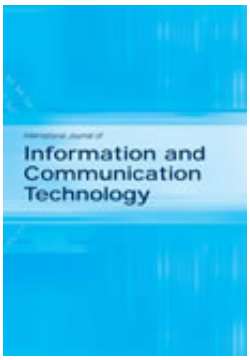

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Comparative analysis of advantages and disadvantages of English teaching combined with multimedia-assisted teaching hidden Markov model algorithm

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Abstract: This study examines the integration of multimedia technology with English language instruction in higher education, focusing on its potential to enhance personalised and independent learning. Anchored in constructivist learning theory, the research explores how multimedia-assisted teaching can bolster students' language skills, communication abilities, and overall engagement. A comparative analysis is conducted to assess the advantages and disadvantages of this teaching method, revealing its effectiveness in promoting comprehensive language acquisition. Case studies provide empirical evidence of the positive impacts on student motivation, language proficiency, and the development of critical thinking skills. The findings suggest that multimedia-assisted teaching, when complemented by the hidden Markov model (HMM) algorithm, presents a valuable framework for evaluating and refining English teaching practices in academic settings.

Keywords: multimedia assisted; English language teaching; comparative analysis of teaching advantages and disadvantages; information fusion; data clustering.

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Biographical notes: Shanshan Zhu studied at the School of Foreign Languages of Zhengzhou University from 2000 to 2004 and received her Bachelor of Arts degree in 2004. Since graduating in 2004, she has been working as an English teacher in Zhengzhou Railway Vocational and Technical College. During her tenure, she has published a total of 8 core journals and general journal papers in Chinese journals. Her main research areas include English linguistics, English education, cross-border business English, etc.

1 Introduction

Through different educational activities and on the basis of the omission of various educational costs, different intelligent features of various students can be identified and applied to maximise the acquisition of knowledge in the multimedia teaching. The evaluation of learning can mainly be divided into the multimedia teaching assessment and the summative assessment (Xiaoling, 2017; Xu, 2015; Hu, 2020). On the basis of the summative assessment approaches, it is difficult to motivate the enthusiasm of students for learning. In the assessment based on multimedia education, the teachers make judgement and affirmation of the interests, attitudes, and participation of the students in activities and language development during the process of English education (Yan, 2019; Pan, 2019), which is conducive to enhancing the enthusiasm of the students for learning. In the practical classroom teaching, English teachers ask students to answer some questions in class, organise them to make dialogues, carry out discussions in groups, and rehearse English sketches to cultivate the positive attitudes of the students toward English learning and foster their spirit of teamwork in the learning process. However, the majority of the above methods are scattered and fragmented, which are lack of clear purposes and systematic features and fail to reflect the subjective drive of the students in the learning process. In this way, it cannot turn those students who are not interested in learning English at all into those who are proficient in English. In addition, there are also problems in the educational contents, curriculum, educational requirements, educational evaluation, and other aspects. Due to the phenomenon of 'one size fit all', students with a profound foundation are not given the appropriate opportunity to fully tap into their talents and thus they are not sufficiently developed in the aspect of their application skills. The students with poor foundations, on the other hand, have to learn very hard but still can hardly catch up. English teaching at colleges and universities without sufficient classification guidance can never comply with the demands of different types of talents for the social and economic growth and the scientific, technical, and cultural development (Liu and Ning, 2017; Qi, 2017; Yi and Huang, 2017).

Traditional English teaching methods, predominantly characterised by instructor-led lectures and textbook reliance, have historically been the mainstay of language education. However, these approaches encounter notable challenges such as a lack of student engagement due to their passive nature, a one-size-fits-all strategy that overlooks individual learning differences, and a limitation in resources that restricts exposure to diverse language contexts. The conventional assessment methods, often concentrated at the end of teaching periods, also fail to provide continuous feedback, making it difficult to timely address and improve upon learning gaps. Furthermore, there is a significant gap between the theoretical knowledge gained in classrooms and the practical application of the language in real-world scenarios. Multimedia-assisted teaching is introduced to counter these issues, offering interactive and personalised learning experiences. It utilises a vast array of digital tools and resources, including videos, interactive software, and diverse online materials, to enrich the learning environment. This approach allows for continuous assessment and the application of language skills in simulated real-world contexts, aiming to bridge the gap between classroom learning and practical usage, and ultimately enhance the overall effectiveness of English language education.

As the evaluation of English teaching is subject to the influence of the environment and conditions, it is necessary to carry out quantitative testing and analysis of the English teaching level to establish an English teaching level analysis model. The fusion and

cluster processing of multimedia assisted information is used to conduct the comparative analysis of English teaching to improve the quantitative prediction capacity in the comparative analysis of the advantages and disadvantages of English teaching. In this paper, a kind of English teaching proficiency estimation method based on the multimedia assisted education hidden Markov model (HMM) algorithm is put forward to implement the comparative analysis and appropriate assessment of the advantages and disadvantages of English teaching.

To provide a comprehensive view of the recent advancements in the field of multimedia-assisted English language teaching, the following section reviews and cites relevant works from the past four years. These works have significantly contributed to the understanding of the integration of technology in language education and serve as a foundation for the proposed approach in this study. Xu (2015) explores the experiential teaching mode, highlighting the importance of practical, immersive learning experiences facilitated by multimedia tools. Hu's (2020) research presents strategies for modular teaching that can be enhanced through multimedia integration. Yan (2019) introduces a micro-course divided teaching model, which is a modular approach that can be effectively supported by multimedia. Pan's work provides insights into teaching management and mode innovation, which can be applied to English language teaching with multimedia. Liu and Ning (2017) examine the principles of teaching reform, which include the integration of multimedia to meet curriculum requirements. Qi (2017) discusses the optimisation of the flipped classroom model and multimedia teaching, providing a comparative analysis with traditional methods.

The integration of multimedia technology into English language teaching has become a pivotal innovation in higher education, offering a dynamic and interactive learning environment. This introduction section aims to underscore the significance of this educational advancement and to set the stage for the proposed approach that leverages multimedia-assisted teaching, underpinned by the HMM algorithm. The traditional methods of English instruction, while foundational, often struggle to cater to the diverse learning needs and styles of students in contemporary classrooms. Multimedia technology introduces an array of tools and resources, such as interactive software, video, and audio materials, which can be tailored to individual learning paths, thus fostering a more inclusive and effective educational experience. The proposed approach in this study addresses the limitations of conventional teaching by introducing a system that not only incorporates multimedia elements but also employs the HMM algorithm to analyse and assess students' language proficiency in a more nuanced and data-driven manner. This method promises a more objective evaluation of students' progress and a more adaptive learning process that can respond to their evolving needs.

2 Multimedia assisted teaching HMM algorithm

For the purpose of evaluating the quality of English teaching properly, first of all, it is necessary to establish an English teaching proficiency assessment model. In combination with the HMM algorithm, the English teaching proficiency is evaluated accordingly. The indexes for assessing the English teaching proficiency are a set of nonlinear variables. The relevant distribution model of English proficiency assessment dimensions is constructed, in which the main indexes for assessing the English teaching proficiency

include the teaching proficiency level of teachers, the investment in the educational facilities, and the relevance level of policies.

The HMM is a statistical model that is particularly useful for time-series data and is widely used in various fields, including speech recognition, natural language processing, and bioinformatics. In the context of this study, the HMM algorithm is employed to evaluate the proficiency levels of English teaching by analysing sequences of teaching activities and outcomes. The HMM algorithm is used to make predictions about the hidden states (in this case, the underlying proficiency levels) based on the observed data (student performance, feedback, etc.). It does so by using a combination of forward, backward, Viterbi, and other algorithms to calculate the most probable sequence of hidden states that could have led to the observed sequence of events. In the educational setting, the HMM algorithm can help in: Assessing the effectiveness of teaching methods. Identifying areas where teaching proficiency may need improvement. Predicting student outcomes based on teaching practices. Personalising instruction by adapting to the proficiency levels of both teachers and students. By incorporating the HMM algorithm into multimedia-assisted teaching, the study aims to provide a more nuanced and data-driven approach to evaluating and improving English language instruction in higher education. This method allows for a more objective and systematic analysis of the complex interactions between teaching methods, student engagement, and learning outcomes.

It is assumed that the English teaching database can be divided, and the sample sets are (x_i, y_i), $i = 1, 2, \ldots, n$, $x \in R^d$, $y \in \{-1, +1\}$. In the subspace, the form of the linear classification function is a specific classification surface equation in general, that is, $dg(x) = w \cdot x + b$. Then, the following can be obtained

$$w \cdot x + b = 0 \tag{1}$$

For the purpose of ensuring that the classification surface can be used to classify all samples correctly, it is necessary to meet the following conditions

$$y_i \left[(w \cdot x) + b - 1 \right] \geq 0, i = 1, 2, \cdots, n \tag{2}$$

In summary, the conditions described above are met, and the minimum classification surface is the optimal classification surface. The matching of the string similarity can be converted from solving the problem of optimal classification aspect to addressing the following constrained optimisation problem; that is, under the conditions of meeting the constraints of the equation (2), solving the function as the following

$$\varphi(w) = \frac{1}{2} \| w \|^2 = \frac{1}{2} (w \cdot w) \tag{3}$$

is the minimum value. Hence, the problem is further converted to the Lagrange function as the following

$$L(w, b, a) = \frac{1}{2} (w \cdot w) - \sum_{i=1}^{n} a_i \left\{ y_i \left[(w \cdot x_i) + b \right] - 1 \right\} \tag{4}$$

The optimal classification function can be derived by solving the problem, and the details are shown as the following

$$f(x)=\operatorname{sgn}\{(w^{*}\cdot x+b^{*}\}=\operatorname{sgn}\left\{\sum_{i=1}^{n}a_i^{*}y_i\cdot(x_i\cdot x)+b^{*}\right\} \tag{5}$$

In the above equation, sgn() is the symbolic function. With regard to the exact linear divisibility, the samples can be treated in accordance with the process from the equation (1) to equation (5). However, if the samples cannot be linearly partitioned, it is necessary to introduce a relaxation variable; that is, the condition can be met by adding a relaxation variable to the equation (2), so that equation (2) can be applied to the following

$$y_i\left[(w\cdot x)+b-1\right]+\xi_i\geq 0,\ i=1,2,...,n \tag{6}$$

is used as the replacement, and the corresponding objective function can also be converted to identifying the minimum value as the following

$$\phi(w,\xi)=\frac{1}{2}\|w\|^{2}-C\left|\sum_{i=1}^{n}\xi_i\right| \tag{7}$$

The comparative analysis of teaching advantages and disadvantages is an integral part of English multimedia teaching in graduate schools. The comparative analysis of teaching advantages and disadvantages mainly include the comparative analysis on the teaching advantages and disadvantages of multimedia education, the comprehensive comparative analysis of the advantages and disadvantages, the comparative analysis of the process advantages and disadvantages, the comparative analysis of the developmental advantages and disadvantages, the comparative analysis of the multiple advantages and disadvantages, the comparative analysis of the alternative advantages and disadvantages, the comparative analysis of the direct advantages and disadvantages, the comparative analysis of the expressive advantages and disadvantages, the comparative analysis of the authentic advantages and disadvantages, and the comparative analysis of the diagnostic advantages and disadvantages (Bao, 2017; Li, 2017). Among the many methods of comparative analysis on the advantages and disadvantages, the most common method is the research on the comparative analysis of the advantages and disadvantages of multimedia education. First of all, at the beginning of the semester, the relevant survey and examination are conducted on the students with regard to their interest in learning English to understand the desire of the students to learn and enhance their language skills within the shortest possible time in the classroom. Subsequently, the study documents are prepared for the students. In addition, teachers carry out interviews and questionnaires throughout the semester to gain a more comprehensive picture of the progress and learning experiences of the students in the learning process. The comparative analysis on the advantages and disadvantages of multimedia education is conducted on the daily English teaching. The following three aspects of teaching are carried out in conjunction with the content of English language learning.

1 With 10 minutes left in the oral English teaching class, students are provided with an opportunity to communicate orally in English. The teacher rates the students based on their performance on the spot. Even if the topic is closely related to the theme of the cell, it can be opened. Through these activities, students are trained to express themselves correctly and fluently in English. The focus of the activities is about

encouraging the students to speak in English boldly and helping them not be afraid of making mistakes.

2 Examinations for listening education are centred on the learning of listening skills of the students in class.

The weekly class is arranged for the students to practice listening and check their learning result through the quiz in class. During classroom teaching, the students are required to analyse carefully the sentences they do not understand and enhance their vocabulary memory. If the students have difficulties due to a lack of background knowledge, they are encouraged to read more materials in the relevant area. The teacher will also teach them some methods to form a positive attitude towards the gradual improvement of the students. It is also emphasised that imitation is an effective way to enhance the listening training and improve the students' sense of English pronunciation and intonation.

3 The reading and writing class. The comparative analysis on the advantages and disadvantages of multimedia education includes two main parts in the unfolding of English reading and composition. Secondly, the students learn to write essays in English, and the level of the students' writing is revealed in written reports accordingly.

The data collection process in this study was meticulously designed to ensure a comprehensive evaluation of multimedia-assisted teaching. The following methods were employed: pre- and post-assessments: standardised English proficiency tests were administered to gauge improvements in language skills over the course of the study. These assessments were aligned with established educational benchmarks to ensure validity. Classroom observations: Detailed records were kept of classroom activities, capturing the integration of multimedia tools and the interactive dynamics between students and instructors. Student surveys: A survey instrument was developed to solicit student feedback on their experience with multimedia-assisted instruction. The survey included a mix of quantitative and qualitative questions to assess engagement and satisfaction. Teacher feedback: Instructors provided insights into the implementation challenges and benefits observed during the multimedia-assisted teaching process.

Data analysis was conducted using a hybrid approach involving both the HMM algorithm and conventional statistical techniques: HMM Algorithm: This probabilistic model was applied to analyse the sequential patterns in teaching activities and student performance. It facilitated the understanding of the progression through different teaching proficiency levels. Descriptive statistics: Summary statistics were computed to describe the demographic characteristics of the sample and the central tendencies and variability of the proficiency test scores. Independent samples t-test: This statistical test was used to determine if there were significant differences in language proficiency gains between the multimedia-assisted and traditional teaching groups. Qualitative analysis: The qualitative data from classroom observations and surveys were analysed thematically to identify key themes related to student engagement and instructional effectiveness. Reliability and validity checks: Inter-rater reliability was assessed for observational data, and the HMM model's predictive accuracy was validated using cross-validation methods.

3 Advantages of multimedia-assisted teaching

The application of multimedia in English language classroom teaching in higher vocational schools based on the multimedia assisted HMM algorithm can be highly effective in improving the English language learning and overall learning abilities of the students (Shu et al., 2017; Seçer et al., 2015). From the perspective of cognitive enhancement, MESI has made full use of sufficient computerised multimedia educational skills so that the visual instructions such as television, office PPT, audio and video functions can be integrated with the computerised integrated teaching equipment, so as to make English language teaching have sufficient fun and can greatly stimulate the interest of students. In this model of teaching, appropriate adjustment is made on the basis of the abilities of students, which allow for the cognitive level of all types of students to be improved to a certain extent in an effective manner.

The student enrolment at higher vocational schools has been difficult in the last few years due to the implementation of the self-enrolment and early enrolment models. The number of students applying for higher vocational schools is decreasing slowly, and the composition of the student sources has diversified features. This is bound to bring about new difficulties to the higher vocational English teaching, as the English proficiency of students who are enrolled to the schools by various admission means can be significantly different; and the English proficiency of students from remote and poor regions is relatively low in general. With such a diverse composition of students, it is not possible to comply with the requirements of all the students for English learning based on the 50-minute lectures in class alone, because students at present are curious about new things while at the same time it is still difficult for them to learn on their own. Hence, it is highly necessary to add the scaffolding teaching approach to the normal English teaching in higher education institutions. Firstly, teachers are required to prepare teaching videos, PPTs, or other materials with a duration of about 15 minutes. The contents of the lectures should be in-depth and simple, while containing the essential knowledge points in each chapter as the primary leaning objectives to ensure that those students with relatively low English proficiency can complete their learning independently, and the students with relatively high English proficiency can also have the opportunity to further improve their skills. At the beginning of the lesson, the teacher should monitor the students to a certain extent and include the inspection of certain pre-reading contents in the lesson. For example, in the warm up session of each class, students are asked questions based on the content of the lesson so as to check the effectiveness of their learning. This can enhance the ability of students to learn on their own initiative, reflect their learning results, help them develop good habits of self-discipline during the learning process, and allow them to identify and address problems in class based on the questions they put forward. In this way, the efficiency of English teaching classes will be improved substantially (Hazrati, 2015).

The ultimate goal of education is to cultivate and train senior talents who are useful to the society. In the past, based on the traditional education model in China, teachers were placed in a dominant position, and thus little attention was paid to the involvement and engagement of students on this basis. As a result, the majority of the students become so-called ‘good students’ who are so obedient that they cannot even think independently, and most of them have no initiative in learning and lack imagination and creative thinking. The famous scientist Albert Einstein once famously said, “Imagination is more important than knowledge. For knowledge is limited to all we know and understand,

while imagination embraces the entire world, and all there ever will be to know and understand." The purpose of this research is to investigate how to improve the active engagement of students in teaching and learning, and to develop students with sufficient imagination, novel and unique thinking, as well as comprehensive knowledge and skills on all fronts. In accordance with this study, it is observed that the multimedia assisted teaching based on the HMM algorithm in the English classes of higher education is not only more effective than the traditional teaching approaches in many aspects, but can also motivate the students to learn more and develop their active learning capabilities. In addition, this teaching method can stimulate the learning initiative of the students, develop their active learning capabilities, and make learning a fun experience. Hence, it is believed that the multimedia assisted teaching HMM method is not only a technical method, but also a qualitative transformation of the relevant learning approach, which is a change from the traditional teaching concept focusing on 'teaching' to 'learning' and 'guiding', which is a major development and upgrade from the basic concept of 'teaching' to 'learning' and 'guiding'.

3.1 Individualised teaching and language context development

With regard to the emphasis on individualised teaching, it means that the various possible meanings of English can be converted into the unique meaning required for expression. A consistent linguistic environment can activate various related maps in the memory of the learner to achieve the complete and accurate understanding of the English language. For this reason, the establishment of an authentic language environment is a goal that modern English language learners strive to compete with each other to accomplish in the classroom. Some parts of communicative language are composed primarily of linguistic symbols; however, the vast majority of the relevant elements are made up of non-linguistic symbols (Izabela, 2016; Stankova, 2019). In the analysis of the non-linguistic elements of the English communication language, the traditional model of teaching is no longer effective. In comparison, the multimedia assisted teaching HMM algorithm makes it possible to include not only the human-computer mutual cooperation in the learning process, but also the human-to-human mutual cooperation modes attributing to its inherent features; that is, the mutual cooperation between the students and the teachers and the mutual cooperation between the students and the other students. If they have any problems and difficulties in the process of their studies, they can get effective guidance on the Internet or communicate with the other students through their teachers. The students can also use the class period to have a face-to-face meeting with the instructor and teacher on a weekly basis.

3.2 Language skills training and communicative practice

The multimedia teaching system has the strength of fully integrating the advantages of various educational resources. In particular, the advantages of digital audio and video in English teaching are prominent. The course contents for learning include reading and writing. In addition, there are learning contents such as the instruction of learning strategies and the relevant Western culture. The whole system is mainly composed of the complete teaching process of the teaching goal setting, teaching implementation, and teaching goal accomplishment inspection. During the process, the students can choose the corresponding part of the class on the basis of the teaching objectives and their actual

English level; and with regard to the content that they are relatively weak in, such as pronunciation and speaking, they can enter the lecture system of the multimedia education system for further learning and improvement. The training of language skills is a kind of mutual human-machine training, such as listening training, speaking training, and composition skills training. The students can also learn the cultural knowledge of the designated cell topic and then go to the classroom where the language is taught, where the teacher can help the students practice with each other by using various methods of listening, reading and writing. Throughout the practice process, the teacher and students can work together to design socially relevant language activity projects, organise interviews with students in and out of the school on site, or conduct telephone surveys on specific topics and social issues, and create applications, letters or study plans for the students to study abroad. The students can also create applications, letters or study plans for them to study abroad so as to improve their oral English skills in listening and reading.

3.3 Stimulating student interest and attention

Interest is a very excellent teacher, because it can engage the students in a way that they will pay attention to the matters that they are interested in, and attention is of important significance for whatever knowledge they learn. It is essential to ensure that the students are able to concentrate their mind and eliminate their mental fluctuations in time and accurately so that they can reflect on the relevant objective things. In accordance with psychological studies, the stimulation of attention is inextricably linked to the features of the stimulus, and a variety of colourful stimuli are more likely to attract the attention and maintain its stability. In general, multimedia instruction brings together moving images, rich graphics, abundant texts in different forms, as well as highly compelling sound. This method is irreplaceable in terms of its variability, uniqueness, and richness. Hence, it is uniquely positioned to stimulate and maintain the attention of students in the classroom.

4 Simulation experiment and analysis

4.1 Experimental objectives

Through the experiment, the multimedia equipment is used to change the way of the traditional classroom teaching methods with the existing knowledge as the foundation, the teachers as the guide, and the knowledge transfer as the primary features. In this way, the teaching process can be truly implemented based on the essence of the free activities, active investigation, and personal experience of the students. This new teaching method can guarantee the establishment of knowledge through the activities of investigation, discovery, communication, and discussion of the knowledge that has been learned.

4.2 Experimental methods

1 The set of factors X is divided into subsets of an indefinite amount. The factor set X is further divided into s subsets in accordance with certain features, which can be written in the form as the following: $X_1, X_2, \cdots, X_n$.

The above subsets comply with $\bigcup_{i=1}^{s} X_i = X,\ X_i \bigcap X_j = \varnothing (i \neq j),$ in which ∪, ∩ stand for the computational symbols of the set computation and with intersection in turn, and the empty set indicate that X_i and X_j have no intersection. It is assumed that each subset is $X_i = \{X_{i1}, X_{i2}, \cdots, X_{in}\}(i = 1, 2, \cdots, s) \sum_{i=1}^{n} n_i = n,$ in which n stands for the number of all causes in the set of factors.

2 The first-level model is applied to each subset X_i in turn to carry out the multimedia technology. It is assumed that the discussion set is $Y = \{y_1, y_2, \cdots, y_m\}$, and $A \sim = (a_{i1}, a_{i2}, \cdots, a_{ini})$ is assigned as the weight of each index in X_i. In this section, it is only required that $\sum_{j=1}^{n_i} a_{ij} = 1.$ The single-factor approximate comment matrix in X_i is R_i, and thus the first level multimedia technology can be described as the following:

$$B_{i\sim} = A_{i\sim} \cdot R_{i\sim} = \left(B_{i1}, B_{i2}, \cdots, B_{im}\right)(i = 1, 2, \cdots, s) \tag{8}$$

3 The multi-level multimedia technology is carried out by using each X_i as a factor, and the details are shown as the following

$$A \sim = \begin{pmatrix} B_{1\sim} \\ B_{2\sim} \\ \vdots \\ B_{S\sim} \end{pmatrix} = \left(b_{ij}\right)_{s\times m} \tag{9}$$

When teaching in the field, the problem-oriented cooperative learning based on research is advocated, which should focus on the cultivation of the feelings, spirit, and values of the students. During the teaching process, the teacher should exert a leading role to prevent the superficiality and formality in the exploration of the relevant problems; that is, it is necessary to explore the relevant problem to the extent of the maximum depth and width and apply the knowledge that has been learned to answer new questions, so as to ensure the accuracy of the exploration results. The experimental parameters are those in the multimedia assisted English language instruction (MESI) approach, and the variables indicate the changes in the English learning scores of the students. The combination of graphics and sound and colour, and the integration of motion and static have not only enriched the means of English teaching in colleges and universities but also imparted to the students a large amount of information that cannot be conveyed by the traditional teaching model, which, in turn, can further stimulate the enthusiasm of students to learn English. In addition, it has also mobilised the sensory organs such as eyes, ears, hands and brains of the students during their learning process. Thus, this model can reflect the student-centred and multimedia assisted teaching model to some extend, and the details are shown in Figure 1.

First of all, the issue of students' attitudes toward multimedia assisted English teaching in colleges and universities is reviewed, and the details are shown in Table 1.

It can be observed from the data above that the vast majority of students are quite sure or certain that the application of multimedia assisted education can improve their interest

in learning English. Hence, we can definitely believe that through the application of multimedia assisted education, the interest of students in learning English can be stimulated substantially. With regard to the advantages of multimedia, the vast majority of the students feel that the most significant advantage of multimedia is 'three-dimensional, visual, and vivid'; and this answer represents a proportion of 59%. Thus, in the teaching design, it is recommended that more colourful multimedia means should be adopted to illustrate certain abstract knowledge.

Figure 1 Multimedia assisted teaching model (see online version for colours)

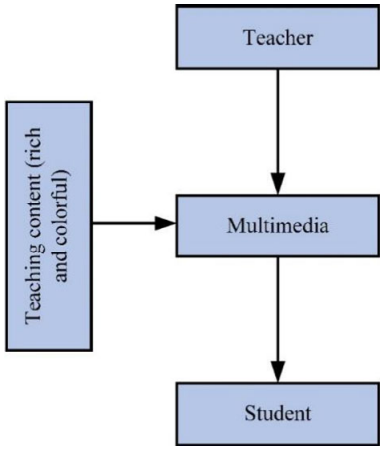
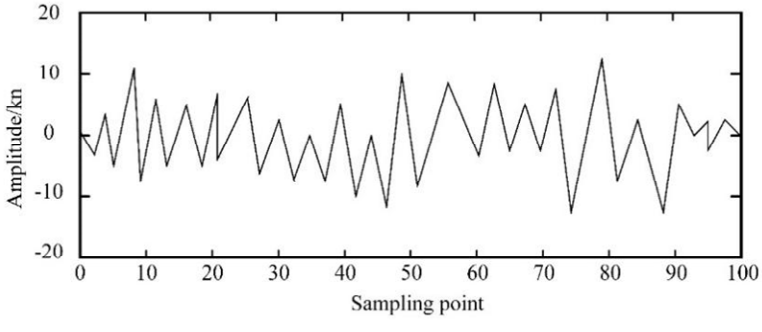


Table 1 Comparison of students' attitudes toward multimedia assisted English teaching in colleges and universities in the experimental group

Questions	*Not at all*	*A little bit*	*Very great*
Do you think the application of multimedia in English classes is helpful to enhance your interest in learning?	3 10.3%	15 51.7%	11 37.9%
What do you think is the greatest advantage of multimedia assisted education? Such as saving time and effort, with huge knowledge capacity, three-dimensional, visual, and vivid.	9 31%	3 10%	17 59%

Figure 2 Time domain waveform of the multimedia assisted time domain distribution



The multimedia assisted performance analysis based on the MATLAB simulation analysis method is used to carry out the test of the comparative analysis on the advantages and disadvantages in English language teaching, and the data samples in the comparative analysis of the advantages and disadvantages in English language teaching are implemented by using the evaluation method. On the basis of the dimensional settings described above, a major data reconstruction is conducted in the evaluation of the comparative analysis on the advantages and disadvantages in English language teaching, and Figure 2 shows the time domain waveform of the major data distribution.

Figure 3 The evaluation accuracy analysis of the method in this paper and the traditional method

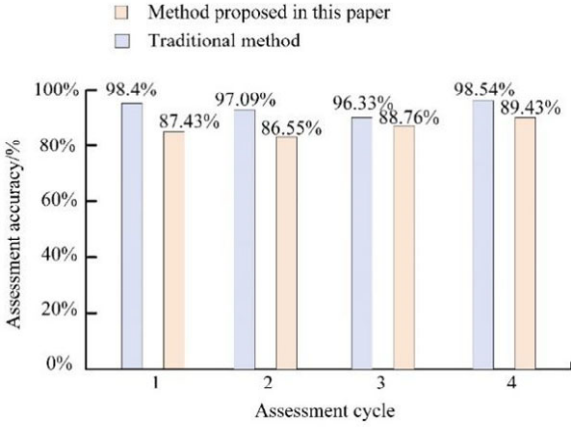
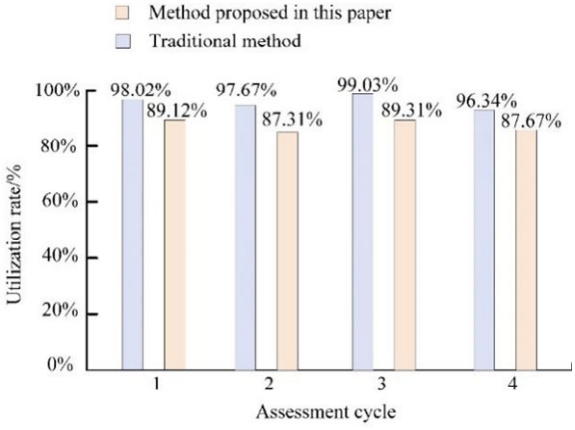


Figure 4 Utilisation analysis of the method in this paper and the traditional method (see online version for colours)



The results of the multimedia assisted statistical analysis on the index dimensions in the comparative analysis of the advantages and disadvantages of English teaching (as shown in Figure 1) are taken as the object of research on the processing of data clustering and information fusion. In this way, the comparative analysis of teaching advantages and disadvantages can be implemented (Figure 3 and Figure 4). Table 2 shows the benchmarks of the evaluation. The results of the test on the indexes such as correctness

are analysed, and it is found that based on the method put forward in this paper, the accuracy of comparative analysis of the educational advantages and disadvantages is high and that the utilisation rate of educational resources is high as well.

Table 2 Comparison of the performance test results

Evaluation cycle	*Method proposed in this paper*		*Traditional method*	
	Evaluation accuracy rate/%	*Utilisation rate/%*	*Evaluation accuracy rate/%*	*Utilisation rate/%*
1	98.41	98.02	87.43	89.12
2	97.09	97.67	86.55	87.34
3	96.33	99.03	88.76	89.31
4	98.54	96.34	89.43	87.67

5 Conclusions

In the traditional teaching evaluation process, English teachers serve as the subjective evaluators in the traditional assessment, while students can only act as the passive recipients of the corresponding assessment. As a result, the evaluation subjects can be excessively homogeneous. Hence, with regard to the multiple intelligence optimisation filter knowledge model, the primary evaluation subjects can be diversified, because each specific individual may have different types of intelligence and mathematical theories. As English teaching is an essential way for students to learn English at colleges and universities, the quality of English teaching has attracted more and more attention. With the implementation of a new round of opening up to the outside world and the 'going global' strategy in China, English teaching in higher vocational education is facing new challenges and opportunities for development as well. English teaching is not merely about imparting theoretical knowledge to students, but also about cultivating the learning ability and knowledge application capacity of the students. The single teaching model can no longer comply with the demands of modern teaching, and it is necessary to change the teaching concept and introduce new teaching methods accordingly. In this paper, a method for the comparative analysis of the advantages and disadvantages in English teaching based on the multimedia assisted teaching HMM algorithm is put forward by comparing the advantages and disadvantages in English teaching and conducting the related analysis. Through research, it is found that the comparative analysis of the advantages and disadvantages of English teaching based on the proposed method is highly accurate, and that the efficiency of the utilisation of English teaching resources is improved as a result. The study conclusively demonstrates that multimedia-assisted teaching significantly improves English language proficiency in higher education. By integrating interactive tools and leveraging the HMM algorithm for assessment, the approach has been proven to be more engaging and effective than traditional methods. The findings underscore the need for personalised and dynamic educational strategies that can cater to diverse learning styles. For future research, it is recommended to explore the long-term impact of multimedia-assisted teaching on student retention and application of language skills in real-world contexts. Additionally, investigating the scalability of this approach in different educational settings and its adaptability to various languages and subjects could provide further insights into the broader potential of technology in

enhancing educational outcomes. This study paves the way for innovative educational practices that prioritise student engagement and learning effectiveness.

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