Development Trend of Multimedia Technology in Enhancing Human-computer Interaction in English Learning Environment

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Abstract English learning environment is an important part of English teaching and can provide students with space to practice language. Cultivating students' learning ability is the essence of education and the necessary prerequisite for social development. The formation of English learning environment plays an important role in improving the classroom English atmosphere. In a good English learning environment, students can test their English level, quickly identify the differences between students, and make appropriate compensation and targeted improvement. There are still many defects in the current English learning environment, which cannot effectively promote students' learning. Therefore, this paper analyzed the differences between traditional and multimedia enhanced English learning environment, and then analyzed the problems that need to be solved in the construction of English learning environment using multimedia according to the feasibility and impact of English learning environment. Finally, this paper put forward some optimization strategies to strengthen the communication and learning between students and multimedia. According to the experimental analysis, the average learning efficiency of students in multimedia English learning environment was 11.7% higher than that in traditional English learning environment, and the average effect of teacher-student interaction was 8% higher than that in traditional English learning environment. In short, multimedia technology and human-computer interaction can promote the construction of English learning environment.

Index Terms English Learning, Multimedia Technology, Human-computer Interaction, Construction of Learning Environment

I. Introduction

The application of modern information technology, especially multimedia technology in the field of education, has entered the field of education, making fundamental changes in the content and means of education. Multimedia human-computer interaction has changed the textbook-centered learning environment, created a student-centered information technology learning environment, and has rich online multimedia learning materials and virtual reality. Learning environment is an important factor affecting learning efficiency. Therefore, it is necessary to establish a multimedia environment for online English teaching in schools to improve the quality of English teaching. Multimedia to enhance the English school environment has become an important issue in the current English teaching reform.

English learning needs to use many techniques to assist teaching. Elaish, Monther M was conducting a comprehensive analysis of the research on mobile English language learning materials to launch an evidence-based discussion on the application of mobile learning in English language education [1]. Khotimah, Khusnul made suggestions for teachers and teachers' education plans by investigating teachers' and students' views on autonomous learning in English teaching and the extent to which teachers promote students' autonomous learning [2]. Ahmadi, Dr discussed different attitudes that support English learners to improve their learning skills through the use of technology. He put forward some suggestions for better use of these technologies to help learners improve their learning skills [3]. Syafiq, Ahmad Nur tried to find ways to use video to improve students' oral skills, and how to use video in teaching and learning process in class. This can improve students' oral skills during online learning [4].

Rifiyanti, Hafizah found out learners' views on online English learning during the pandemic, and online learning considers using appropriate technology, quality and teachers' ability to enhance and encourage learners to participate in online learning environment [5]. Cheng, Ching-Hsue explored these factors in primary school students' English learning performance by using a mobile assisted English learning system including interesting and interactive games. He also tried to teach through mobile assisted English learning system [6]. Jamrus, Mohd Hafizuddin Mohamed reported on the readiness and acceptance of Malaysian English teachers to use augmented

reality in English teaching, as well as their intention to use augmented reality in English reading teaching [7]. The studies have described the application of different technologies in English learning, but there are still some deficiencies in the enhancement of English learning environment.

Many scholars have studied the enhancement and improvement of English learning environment. Wong, Jacqueline reviewed the research on methods to support self-regulated learning in various types of online learning environments and how they address human factors. Future research can use learning analysis to understand learners at a fine-grained level [8]. Rukmana, Gede Weda surveyed students' views on using Google Classroom as a language teaching medium. He found that Google Classroom can help students easily save the documents or materials provided by teachers through Google Classroom, and students can also easily submit their homework on this platform [9]. Albiladi, Waheeb S examined the academic and social benefits of using blended learning in a foreign language context. He found that it can be effectively used to develop language skills, improve the English learning environment, and promote students' motivation to learn language [10]. The studies have all described the importance of English environment enhancement, but have not involved the application of multimedia technology.

In order to analyze the development of human-computer interaction in the multimedia technology enhanced English learning environment, this paper analyzed the errors generated in the English learning environment through neural network algorithm, and then compared the differences between the multimedia enhanced English learning environment and the traditional learning environment. Finally, it was found that multimedia technology can effectively improve students' autonomous learning ability and reduce differences in learning resources. Compared with other literature, this paper mainly compared students' autonomous learning ability and reading level through experiments.

II. Differences between Multimedia Technology Enhanced English Learning Environment and Traditional Learning Environment

The differences between traditional English learning environment and multimedia enhanced English learning environment can be analyzed from the following aspects, as shown in Figure 1.
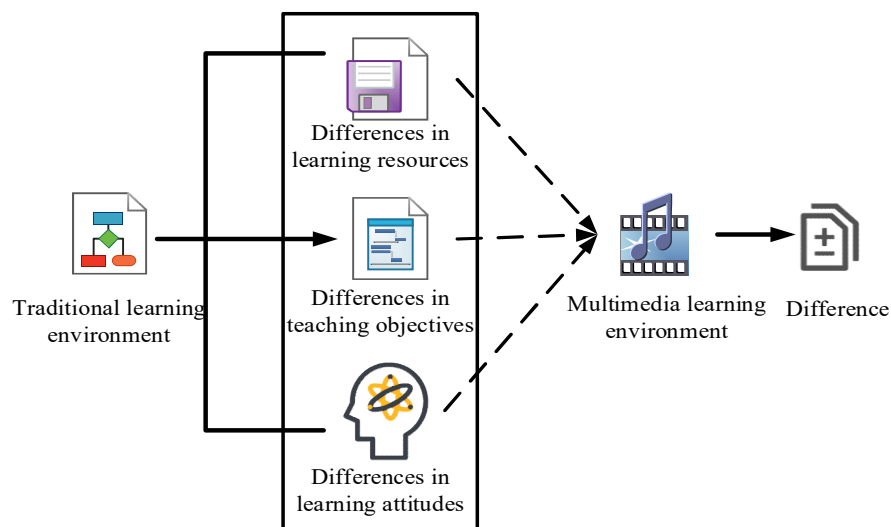

Figure 1: Difference between traditional English learning environment and multimedia enhanced English learning environment

II. A.Differences in Learning Resources

In the traditional English learning environment, although modern technology has also been used to introduce digital learning methods, there are many essential differences and significant differences between the concepts and models of intelligent learning. The first is to define the learning environment and place. In other words, the teaching environment is usually classroom or laboratory. Secondly, the available educational resources are seriously insufficient. Although teaching is sometimes provided in the form of multimedia, it is not only a copy of textbook content, but also has no substantive difference from traditional teaching methods. Finally, the use of limited educational resources, especially textbooks, and other learning tools is limited. The combination of these gaps and defects is the key factor that hinders the development and progress of students and teachers.

In the multimedia enhanced English learning environment, teachers' learning process can be closely linked with students' learning process and information technology to achieve common development. Learning resources

enable students to improve learning motivation and creativity [11]. Multimedia technology has successfully eliminated the dependence on auxiliary learning methods and become the most important learning method and learning resource. This learning method is the coexistence of online and offline learning, which breaks through the unique situation of the school, allows students to learn at any time and anywhere, blurs the boundary between formal and informal learning, and achieves the goal of learning at any time.

II. B.Differences in Teaching Objectives

The previous teaching methods were often limited by the number of courses and students, leading many teachers to ignore the content and quality of courses to supplement the course and learning progress. In this case, learning reflects the reduction of learning objectives. The purpose and premise of education is to provide students with appropriate learning opportunities and conditions and create appropriate learning environment for them. In order to provide students with balanced and equal learning opportunities, multimedia can improve English learning in the context of English learning and information technology, which is inseparable from education, and improve learning efficiency through learning terminals.

It then improves the curriculum through flexible schedules and learning plans. The training can be reasonably organized according to the life plan. On the other hand, this seamless connection can help students freely access more learning resources and interact with each other, ultimately leading to deeper learning. Through active leadership, teachers can give each student their own qualities and interests, which is conducive to personal development. Teachers can determine the task list related to each student's learning activities, guide students to carry out intelligent learning, promote students' intellectual development, and improve classroom objectives.

II. C.Differences in Learning Attitudes

The correct learning attitude to deal with the problems and differences in the current learning process is the decisive factor in the students' learning process. In modern English class, this is the state of students' obedience, and students passively receive information. They are unable to engage in subjective activities, actively develop their personality, and gain opportunities for personality development, which greatly limits the efficiency and quality of teaching. In order to improve the level of English learning in multimedia, computer learning terminals can be used to stimulate students' interest in learning and cultivate their personality. It should cultivate the attitude of learning freedom, eliminate the inferiority complex of students due to the differences in external environment to the maximum extent, and give full play to students' initiative.

III. Feasibility and Impact of Multimedia Technology to Enhance English Learning Environment

III. A. Feasibility of Using Multimedia Technology to Enhance English Learning Environment

With the development of computer multimedia technology and the emergence of various English learning courses, computer multimedia technology can help English teaching and bring English teaching to personalized learning without time and place constraints, as shown in Figure 2. In the English learning environment, students can hear the real language and intonation through the environment, scene and dialogue built by multimedia information technology, and can see the expression and attitude of the speaker. In a practical and inclusive dynamic learning environment, people can reflect on the influence of immersion and intuition, develop their understanding, absorb and imitate their language skills, and unconsciously enter the field of English thinking and problem solving.

In the context of English teaching reform, schools have stepped up the establishment and improvement of multimedia language interaction laboratories, mainly using advanced multimedia technology, network technology and advanced digital language processing technology. This can provide students with the necessary learning tasks for reading and writing, listening practice, language testing and learning areas. Therefore, interactive exercises and other autonomous learning materials can be completed, which would help to create and improve the English learning environment at this good opportunity. The main purpose of creating audio-oriented classroom self-study center is to improve the self-study ability of English students, that is, introduce language training into textbooks and classrooms. Because classroom alone cannot meet the needs of students' autonomous learning, more opportunities for learning English should be organized after class to improve the use of language and increase the opportunities for language training.

Due to the importance of vocabulary, mobile dictionaries and vocabulary learning applications are the most popular resource types for learners [12]. By combining the learning environment of hardware and software environment, participants can better adapt to their needs and targeted and planned learning, which can fill the gap and improve practical English skills.
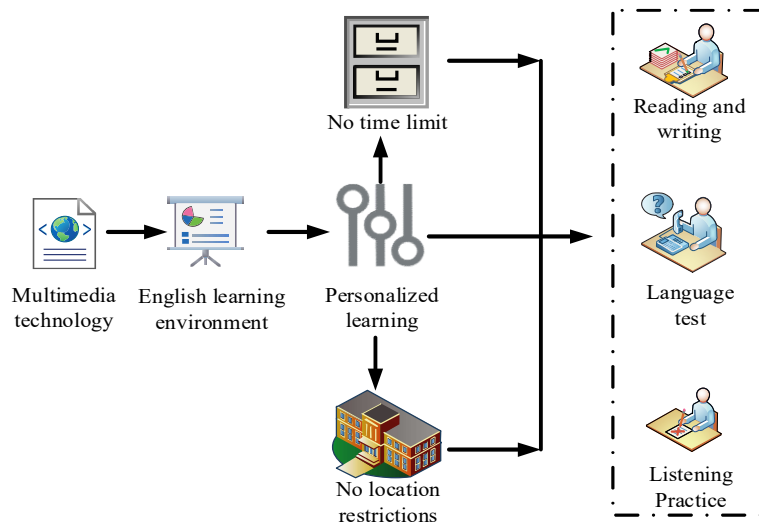
Figure 2: Feasibility analysis of multimedia technology enhancing English learning environment

III. B. Multimedia Technology Enhances the Impact of English Learning Environment on Students

Multimedia technology has had a lot of positive effects on students after enhancing the English learning environment, as shown in Figure 3.

The first is to stimulate interest in English learning. In multimedia English teaching, students learn easily without pressure, and the class is fun and entertaining. They have various forms and various channels, such as films, special reports, interviews, entertainment information, advertisements and other matters. It conforms to the psychological and age characteristics of students, stimulates their interest in learning, encourages them to study independently, and helps them achieve the goal of learning foreign languages.

The second is to broaden students' horizons. In the context of multimedia technology, English learning topics cover a wide range of fields. It can help students get familiar with the geography, history, development and cultural traditions of English-speaking countries. It helps students learn world history, understand national conditions and social development trends, help students develop knowledge and broaden their knowledge and vision.

The third is to improve students' reading level. On the one hand, multimedia and other audio resources provide a large number of authentic and natural dialogue materials, which are good examples for students. This can improve the intonation and speech feeling, and broaden students' vocabulary. On the other hand, a large number of facts and cases reported by the media are oral, stimulating discussion and practice, and improving students' wisdom and innovation ability. It improves the content of oral and written exercises and makes the presentation more convincing. By promoting the use of social media, it encourages students to use social media to improve their English language skills [13].

The fourth is to promote students' socialization. Multimedia helps students to make use of social, economic and commercial development trends, understand urban geography, transportation and fierce social competition.

In addition, multimedia technology can help students understand work rules, etc. They can also help students solve the problem of social ignorance caused by dropping out of school, narrow the employment gap between students and urban students, improve their social adaptability and increase their employment opportunities.

III. C. Key Influencing Factors to be Solved for Multimedia Technology to Enhance English Learning Environment

In the process of using multimedia technology to enhance the construction of English learning environment, there are several influencing factors that are important obstacles to the interactive development of English learning environment, as shown in Figure 4. The first is the problem of classroom entertainment. A serious consequence of the multimedia English learning environment is that students hardly take notes and like to take knowledge points with mobile phones. Students do not like to think independently, and can use multimedia human-computer interaction to improve this situation. It also cannot use interactive technology excessively, which would lead to students' dependence. The second is the cultivation of autonomous learning ability. Cultivating foreign language skills through multimedia depends on individual learning initiative. Multimedia learning environment can gradually develop students' autonomous learning ability, find ways to enable students to effectively use the foreign language learning resources and learning guides provided in the network environment. It can monitor and adjust learning

activities during the learning process, and obtain independent information about autonomous learning objectives. At the same time, it can also promote, strengthen and improve the self-consciousness system.
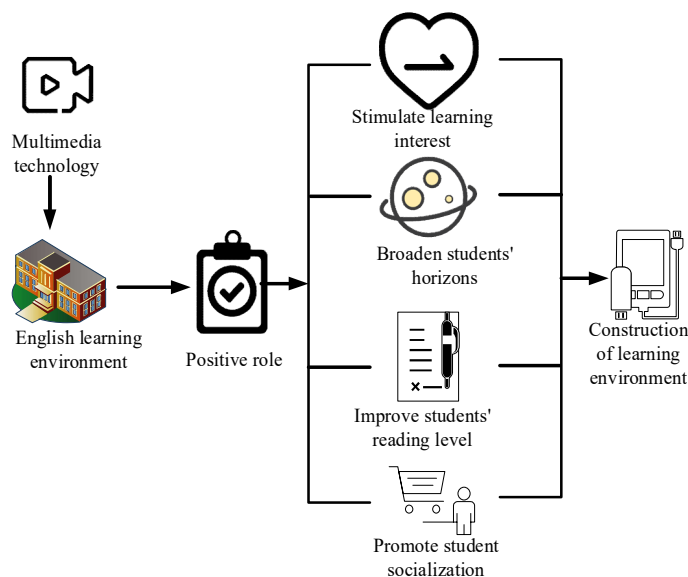
Figure 3: The impact of multimedia technology on students after enhancing the English learning environment

The third is the adaptation of teachers. Multimedia can provide plans for teachers in enhancing the English learning environment, and requires teachers not only to participate in, but also to master the use of computers. It should fully understand the platform resources, reasonably and comprehensively use them, guide and formulate learning strategies. This can form a good English learning environment, help students to achieve self-study as soon as possible. The fourth is the evaluation method and teaching management. In the traditional learning mode, the learning performance evaluation is consistent with the final evaluation result, and the teaching effect is often complementary. In the current English learning environment, teachers can only see relevant learning data after students have completed autonomous learning. This background management needs to integrate the automatic feedback mechanism of the learning process and limit the effectiveness of the learning content because it is difficult to arrange the students' learning schedule or status in time.
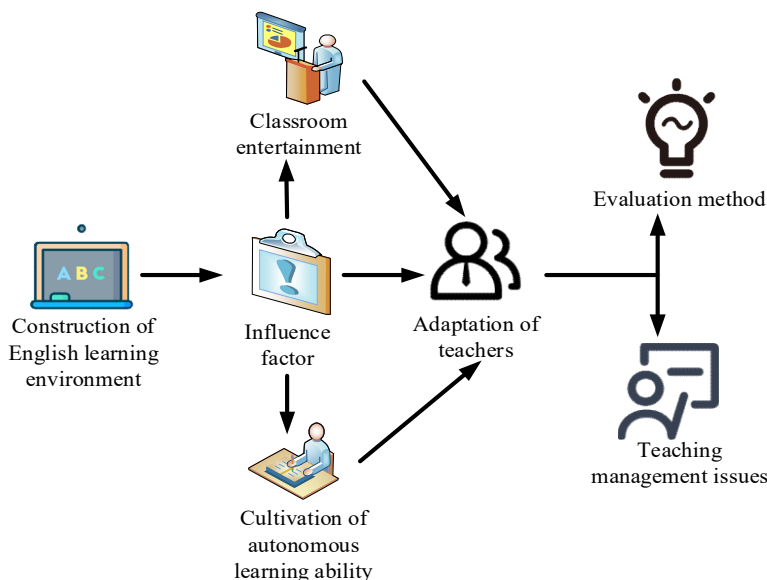
Figure 4: The factors that need to be solved to enhance the English learning environment with multimedia technology

IV. Application of Neural Network Algorithm in Enhancing English Learning Environment

In order to study the specific application of multimedia technology in enhanced English learning environment, this paper analyzes the propagation of enhanced signals in English learning environment through neural network algorithm. This paper also calculates the error signals generated by human-computer interaction in the enhanced English learning environment, and finally obtains the weight adjustment of the enhanced English learning environment. First of all, this paper analyzes the signal output in the enhanced English learning environment under the multimedia technology. It can be obtained that the hidden layer output function of the English learning environment is:

$$a_j' = \alpha\left(\sum_{i=0}^{n} b_{ij} a_i\right), j = 1, 2, \cdots, n \tag{1}$$

a_i, a_j' are the input value and the actual output value in the English learning environment, α is the activation function to enhance the English learning environment, and b_{ij} is the weight value of signal input to output. Then analyze the actual output function of English learning environment as follows:

$$c_m = \alpha\left(\sum_{j=0}^{n} b_{mj} a_j'\right), m = 1, 2, \cdots, k \tag{2}$$

Then, according to the actual output function and output function of the English learning environment, the instantaneous error and average error function of the output function of the enhanced English learning environment under multimedia technology are calculated as follows:

$$S^q = \frac{1}{2}\sum_{m=1}^{k}\left(g_m^q - c_m^q\right)^2 \tag{3}$$

$$S = \frac{1}{2M}\sum_{q=1}^{M}\sum_{m=1}^{k}\left(g_m^q - c_m^q\right)^2 \tag{4}$$

Among them, g_m^q is the expected output value after the enhancement of English learning environment, and c_m^q is the actual output value after the enhancement of English learning environment. Finally, people can get the weight adjustment after the multimedia technology enhances the English learning environment:

$$\Delta b_{ij} = -\frac{\partial\left(S - S^q\right)}{\partial b_{ij}} \tag{5}$$

V. Strategies for Building Interactive English Learning Environment with Multimedia

This paper uses multimedia human-computer interaction technology to build an English learning environment from the following aspects, as shown in Figure 5.
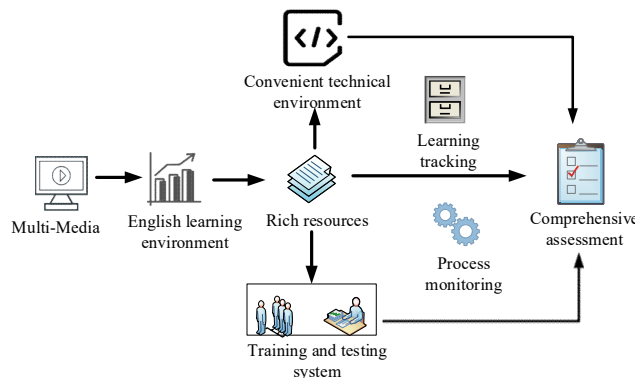

Figure 5: Strategies for constructing an interactive English learning environment using multimedia

V. A. Convenient Technical Environment

The most important indicator to measure the learning environment is students' satisfaction with learning support and whether they have enough hardware and software resources to support their learning. By providing convenient and practical tools and software, such as necessary websites, and appropriate technical guidance, students can study independently and help each other. Intelligent technology robots can report and review different types of learning resources in language learning [14]. As a good English learning environment, it needs to provide quality assurance for students' learning, and its structure also needs to be evaluated and studied. The easy-to-use multimedia social media platform provides the foundation for schools to create an environment suitable for learning English.

V. B. Creating a Resource-rich Learning Environment

The unique and rich online learning environment provides students with a wide range of audio-visual learning environment, using the senses to participate in learning activities, and improving the efficiency of information input and output. Various media resources and Internet websites devoted to English teaching provide rich resources for English teaching at all levels. Teachers and students can have online discussions and interactive exchanges on the English network platform. Teachers can answer students' questions online according to their progress, quickly solve students' learning problems, timely adjust the corresponding progress and learning content through feedback, and improve teacher-student interaction.

V. C. Establishment of Training and Testing System

In order to create a new learning environment based on the dynamic, interactive and teacher-student evaluation of online English courses, personalized multimedia teaching methods can be used to build, and the learning environment must reflect networking and intellectualization. A new evaluation method centered on student development must be adopted as a part of students' active learning and teaching activities. In the past, when using results evaluation, more emphasis was placed on teaching results and the overall impact of teaching at all stages. In order to obtain evidence, learning itself is a dynamic development process. In English multimedia learning, it must make full use of the characteristics of the network, such as fast feedback, easy management, saving time and energy. This can track, monitor, identify, and position the whole learning process to highlight the overall evaluation results of students, which must be evaluated constructively.

VI. Experimental Analysis of Using Multimedia to Enhance English Learning Environment

In order to study the specific effect of multimedia in enhancing English learning environment, this paper analyzes the students' autonomous learning ability and their reading and writing level in the new learning environment. This paper also analyzes the average error and weight adjustment in the multimedia English learning environment by using the neural network algorithm, and compares the learning efficiency of students and the interaction effect between teachers and students in the new learning environment. First of all, this paper surveys the satisfaction of students in three schools with the construction of multimedia English learning environment, of which 50 students are surveyed in each school. The specific results are shown in Table 1.

Table 1: Satisfaction of students in three schools with the construction of multimedia English learning environment

|	Satisfied	Commonly	Dissatisfied
School 1	42	5	3
School 2	40	6	4
School 3	44	4	2
Total	126	15	9

According to the data described in Table 1, the overall students' satisfaction with the construction of multimedia English learning environment is relatively high. Among the satisfied groups, there are 42 students in school 1, accounting for 33.3% of the group. School 2 has 40 students, accounting for 31.7% of this group. School 3 has 44 students, accounting for 34.9% of the group. Among the general group, there are 5 students in school 1, accounting for 33.3% of the group. School 2 has 6 students, accounting for 40% of this group. There are 4 students in school 3, accounting for 26.7% of the group. Among the unsatisfied groups, there are 3 students in school 1, accounting for 33.3% of the group. There are 4 students in school 2, accounting for 44.4% of the group. School 3 has 2 students, accounting for 22.2% of the group. On the whole, the satisfied group accounted for 84% of the total number of respondents. The average group accounts for 10% of the total number of respondents. The dissatisfied

group accounted for 6% of the total number of respondents. Satisfied students think that the English learning environment under multimedia can stimulate learning interest and improve students' autonomous learning time. This allows students to learn English and train in listening and reading anytime and anywhere. The unsatisfied students believed that although the multimedia English learning environment increased the frequency of interaction between teachers and students, the teachers could not always understand the students' learning situation, and the students' problems in learning could not be solved in time.

Then this paper analyzes the students' autonomous learning ability and their reading and writing level in the multimedia English learning environment. A total of three schools were investigated. Each school surveyed 100 people. This paper investigated the different changes of these students in the multimedia English learning environment and the traditional learning environment. The specific changes are shown in Figure 6.
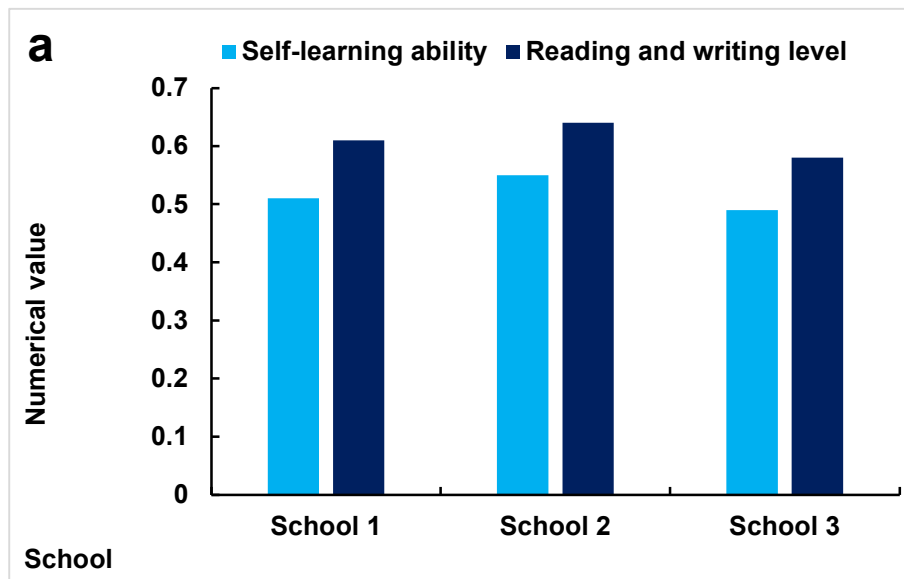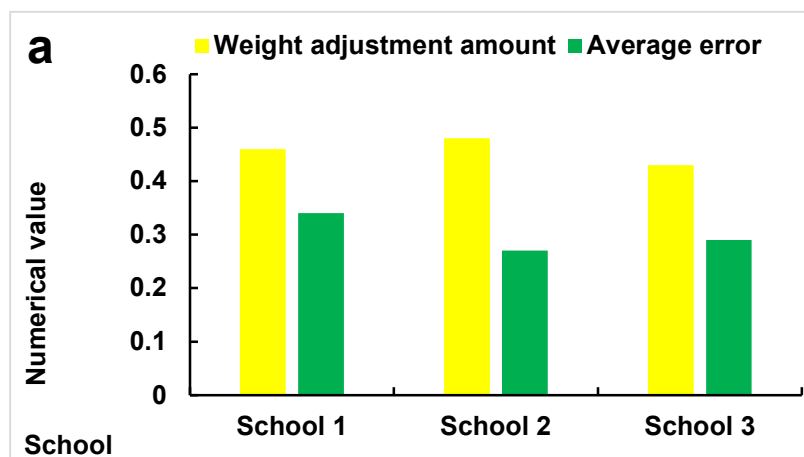

a: Traditional English learning environment
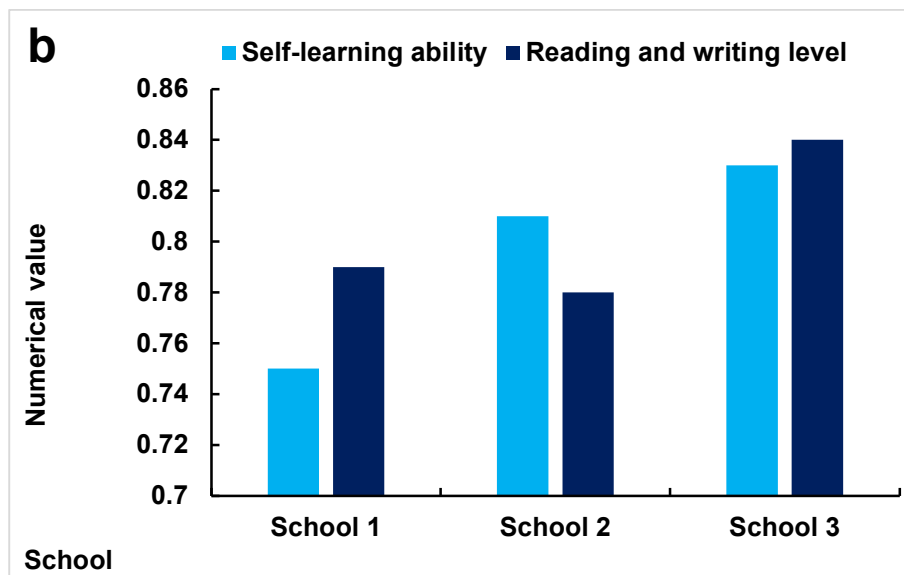
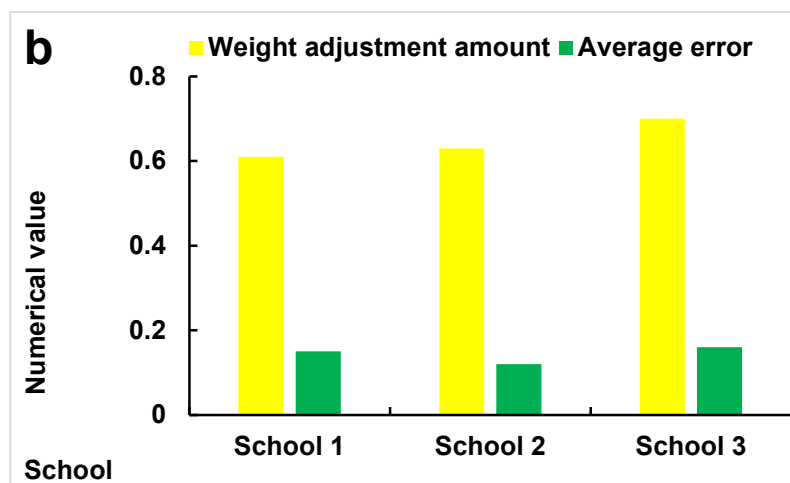b: Multimedia English learning environment

Figure 6: Students' autonomous learning ability and reading and writing level in different English learning environments

Figure 6a shows the changes of traditional English learning environment, and Figure 6b shows the changes of multimedia English learning environment. The students' autonomous learning ability and reading and writing level in the multimedia English learning environment are higher than those in the traditional English learning environment. According to Figure 6a, under the traditional English learning environment, the autonomous learning ability of School 1 is 0.51, and the reading and writing level is 0.61. School 2 has an autonomous learning ability of 0.55 and a reading and writing level of 0.64. The independent learning ability of School 3 is 0.49, and the reading and writing level is 0.58. It can be seen from Figure 6b that under the multimedia English learning environment, the autonomous learning ability of School 1 is 0.75, and the reading and writing level is 0.79. School 2's autonomous learning ability is 0.81, and its reading and writing level is 0.78. The independent learning ability of School 3 is 0.83, and the reading and writing level is 0.84. On the whole, the average of students' autonomous learning ability in the traditional English learning environment is 0.52, and the average of reading and writing level is 0.61. Under the multimedia English learning environment, the average students' autonomous learning ability is 0.80, and the average reading and writing level is 0.80. The comparison shows that the average autonomous learning ability of students in multimedia English learning environment is 0.28 higher than that in traditional English learning environment. The average level of reading and writing is 0.19 higher than that of traditional English learning environment. In the multimedia English learning environment, students can choose appropriate resources for English learning according to their time and needs. In this learning environment, teachers can clearly monitor the learning process of students, and put resources in accordance with their learning conditions.

Then people would analyze the weight adjustment and average error of the school under the multimedia English learning environment, and compare it with the original English learning environment. A total of three schools were surveyed in this paper, and the specific comparison is shown in Figure 7.

a: Traditional English learning environment

b: Multimedia English learning environment
Figure 7: Weight adjustment and average error of schools in multimedia English learning environment

Figure 7a shows the changes of traditional English learning environment, and Figure 7b shows the changes of multimedia English learning environment. The weight adjustment of multimedia English learning environment is higher than that of traditional English learning environment, and the average error of multimedia English learning environment is lower than that of traditional English learning environment. According to Figure 7a, under the traditional English learning environment, the weight adjustment of School 1 is 0.46, with an average error of 0.34. The weight adjustment of School 2 is 0.48, with an average error of 0.27. The weight adjustment of School 3 is 0.43, with an average error of 0.29. According to Figure 7b, under the multimedia English learning environment, the weight adjustment of School 1 is 0.61, and the average error is 0.15. The weight adjustment of School 2 is 0.63, with an average error of 0.12. The weight adjustment of school 3 is 0.70, with an average error of 0.16. On the whole, the average weight adjustment in the traditional English learning environment is 0.46, and the average error is 0.30. The average weight adjustment in multimedia English learning environment is 0.65, and the average error is 0.14. Through comparison, the average weight adjustment of multimedia English learning environment is 0.19 higher than that of traditional English learning environment. The average error is 0.16 lower than the traditional English learning environment. The increase of weight adjustment shows that multimedia can change the way and learning resources in English learning, so as to increase students' enthusiasm. The decrease of the average error indicates that teachers' monitoring of students' learning conditions is more accurate in the multimedia English learning environment.

Finally, this paper analyzes the students' learning efficiency and the effect of teacher-student interaction under the multimedia English learning environment, and compares it with the traditional English learning environment. Specific comparison is shown in Figure 8.

a: Traditional English learning environment

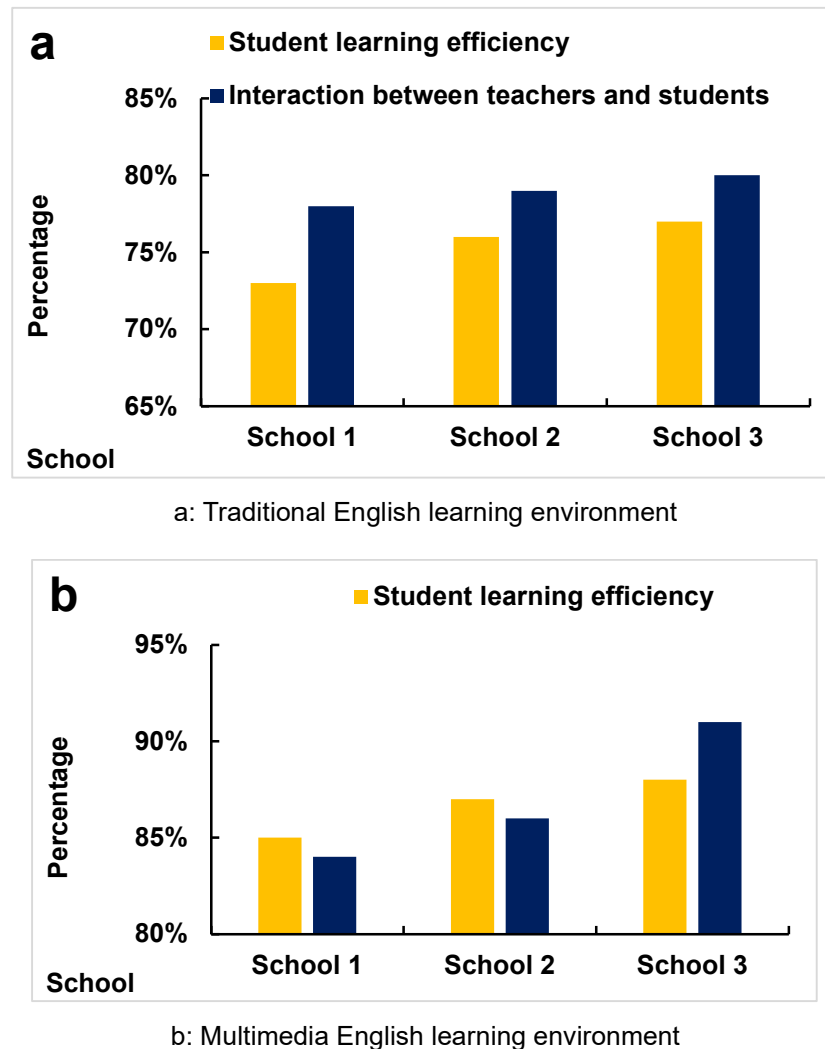b: Multimedia English learning environment

Figure 8: Student learning efficiency and teacher-student interaction effect in multimedia English learning environment

Figure 8a shows the changes of traditional English learning environment, and Figure 8b shows the changes of multimedia English learning environment. According to Figure 8a, under the traditional English learning environment, the learning efficiency of students in School 1 is 73%, and the interaction effect between teachers and students is 78%. The learning efficiency of students in School 2 is 76%, and the interaction effect between teachers and students is 79%. The learning efficiency of students in School 3 is 77%, and the interaction effect between teachers and students is 80%. According to Figure 7b, under the multimedia English learning environment, the learning efficiency of students in School 1 is 85%, and the interaction effect between teachers and students is 84%. The learning efficiency of students in School 2 is 87%, and the effect of teacher-student interaction is 86%. The learning efficiency of students in School 3 is 88%, and the interaction effect between teachers and students is 91%. On the whole, the average learning efficiency of students in the traditional English learning environment is 75.3%, and the average interaction effect between teachers and students is 79%. The average learning efficiency of students in the multimedia English learning environment is 87%, and the average effect of teacher-student interaction is 87%. The comparison shows that the average learning efficiency of students in multimedia English learning environment is 11.7% higher than that in traditional English learning environment, and the average effect of teacher-student interaction is 8% higher than that in traditional English learning environment.

Through the experimental analysis of this paper, it is found that multimedia plays an important role in enhancing the English learning environment. It can improve the learning efficiency of students and promote the communication effect between teachers and students. In addition, under the multimedia English learning environment, English curriculum resources are also more abundant, which can provide more choices for students. This learning environment can stimulate students' autonomous learning ability and improve their English reading ability.

VII. Conclusions

Multimedia human-computer interaction provides a good environment for students learning English and ensures the healthy development of students' practical language skills and language and cultural skills. Multimedia enhanced English learning environment provides a powerful hardware platform for English teaching and a powerful self-assessment platform for students. It uses the network function to create students' electronic files for dynamic evaluation. At the same time, learning objectives and evaluation criteria must be quantified and reflected in specific online learning and consultation. In order to emphasize the development of students' comprehensive skills and qualities, each student should be evaluated and must be scientifically demonstrated on multiple indicators. Only if the school has a perfect online learning environment and interactive English learning platform resources, can students really get rid of the time and space constraints of learning English. This can effectively use mobile learning equipment and scattered time to ensure smooth English learning.

Funding

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