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# Influence of Different Education Methods on Improving the Learning Ability of College Students in the New Era under the Background of Multimedia Education

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***Abstract:*** *With the coming of the data age and the quick improvement of mixed media innovation, countless sight and sound applications have showed up in study hall showing in schools and colleges. Multimedia is represented by the network, which plays a huge role in society with unprecedented potential. The importance of multimedia education in the world has been widely recognized, however, the evaluation of students' learning ability under different educational methods has always lacked a complete evaluation system. This paper introduces Analytic Hierarchy Process (AHP), which is a multi-objective decision analysis method that combines qualitative and quantitative methods. Using the analytic hierarchy process, the quality indicators of multimedia education can be quantified, and the subjective randomness can be avoided, thus making the evaluation more accurate and scientific. The experimental results of this paper show that in the self-learning ability survey of group B before the experiment, 13 students are very active in learning, and 34 students are very inactive in learning, indicating that the students in the two groups before the experiment are not strong in their self-learning ability. After the test, 38 students in group B were very active in learning, and 5 students were very inactive in learning, indicating that the students in group B had improved their autonomous learning ability after the test. Therefore, it is known that the education method under multimedia education can improve the learning ability of college students in the new era.*

***Keywords:*** *Learning Ability of College Students, Multimedia Education, Analytic Hierarchy Process, Educational Methods*

## 1. Introduction

In the present wild global rivalry and the quick improvement of science and innovation, university education should not only equip students with systematic cultural and scientific knowledge, but also have the ability to learn and create independently. The most effective method to further develop the learning skill of understudies is a significant point in the ongoing college educating work. Ability to learn is the capacity of a person to accomplish self-change through changes in the outside climate and requirements for inside objectives during the time spent endurance and learning. Ability to learn is an individual's reaction to the outer climate and an individual's capacity to get by in the public eye. In other words, learning skill is the fundamental capacity of undergrads, and it is the essential quality in the field of hypothesis and practice.

With the entry of multimedia education into campus, it is completely different from traditional teaching, which has brought about a brand-new change in education. At present, multimedia education has become a universal phenomenon. The utilization of media innovation in the homeroom extraordinarily works with educating, enhances the showing content, improves the showing system, and expands the effectiveness of the study hall, accordingly advancing the overall advancement of understudies. The use of multimedia innovation and education in the classroom has an extraordinary role to enhance content, improve systems, and expand effectiveness, thereby promoting overall student progress. Multimedia further harmonizes common media capabilities, allowing educators and students to communicate continuously. This intuitive mode can successfully stir understudies' advantage in learning, animate their hunger for information, and afterward structure their learning inspiration. In view of the special intelligent qualities of multimedia, it can not exclusively be utilized as a showing

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technique, yet in addition can change the conventional showing strategy and, surprisingly, the instructive idea. The development of this paper is that in view of the foundation of mixed media training, different instructive strategies are researched and broke down to further develop the learning skill of undergrads in the new time, and AHP is utilized to assess sight and sound schooling.

## 2. Related Work

If learning ability can be enhanced, college students would be able to achieve individualized development, while traditional schools cannot provide individualized instruction according to each student's personality. The main goal of Kiyoshi's research was to identify key learning abilities in college students, and he didn't read more about children or college academics' reports, but instead focused on the different approaches to education advocated by school teachers. He found that different educational methods can affect the learning ability of college students in various forms [1]. Wang X believed that in view of the importance of cultivating students' autonomous learning ability, it is necessary to develop a teaching method to improve students' awareness and tendency of autonomous learning, and conduct in-depth research and optimization of this method. He created a blended learning approach that combines the benefits of online and offline classroom teaching [2]. Yang Y L adopted a variety of classroom models, provided students with independent learning procedures and time guarantees in the teaching environment, and guided students to complete autonomous learning through teaching, discussion and homework, so as to cultivate students' autonomous learning ability and improve teaching quality [3]. The purpose of Pathoni H's research is to understand how various teaching styles affect students' ability to develop critical thinking. He used the interview format and the assessment of critical thinking ability, and the research method adopted was a mixed method [4]. The above scholars believe that students' learning ability would be affected by various educational models, but this impact has not been fully described.

Audiovisual training alludes to the cautious choice and utilization of contemporary helping media to help showing in the showing system as per the attributes of showing targets and educating objects. The fast advancement of interactive media innovation has set off school educational plan change. Kaur M found that classroom interactions between students and teachers improved due to the growing reputation of multimedia education as a trusted platform. The use of network and multimedia in the field of education creates a creative environment for students, which can not only expand their horizons, but also improve their learning ability [5]. The purpose of Ebied M's research is to examine the value of multimedia in education. His research used experimental research methods and data collection to study how different educational models affect students' learning ability in multimedia education [6]. According to Park S, multimedia educational resources can give teachers the necessary flexibility to modify educational materials in order to more effectively achieve their educational goals. Although the number of multimedia educational resource databases is rapidly increasing, there are few studies empirically evaluating whether multimedia education improves students' learning ability [7]. The above scholars believe that various multimedia education methods would affect the learning ability of college students, but their experiments lack a clear experimental theme.

## 3. Evaluation of the Impact of Multimedia Education on Learning Ability Based on AHP

### *3.1 Different Educational Methods under Multimedia Education*

The development of modern science and technology promotes the modernization of education, so major colleges and universities not only need to update equipment and technology, but also need to change the educational concept [8]. Therefore, on the premise of inheriting and absorbing traditional teaching experience and methods, it is important to change the first showing strategies, present current instructive innovation, and update instructive ideas to address the issues of new educational program guidelines and educational program ideas.

Both media and conventional showing strategies enjoy their benefits and inconveniences. Multimedia education can turn abstraction into intuitive, easy-to-observe and cognition, simplify and make difficult and easy, but making courseware is time-consuming and labor-intensive, so that teachers often neglect the learning of teaching methods, and it is easy to develop into multimedia education and make multimedia courseware [9]. Under the general concept of paperless office, some schools have also formulated corresponding indicators for teachers, such as the proportion of time spent using multimedia technology in a certain course and the quality of multimedia courseware. At the same time,

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major textbooks have also introduced corresponding courseware to assist teaching, which undoubtedly promotes the use of multimedia in teaching.

(1) The teaching method of situational teaching

Situational teaching refers to the purposeful introduction or creation of specific scenarios by teachers in accordance with the teaching purpose. Vivid and emotional, these scenarios evoke the same emotional experience by transporting students into a special classroom art. It stimulates students' emotions in a short period of time, helps to understand textbooks to some extent, and promotes students' psychological functions [10-11]:

(2) Inquiry-based teaching method

The new curriculum reform poses a great challenge to teachers, requiring teachers to establish a set of modern educational concepts and teaching behavior models, which has led to changes. This transition emphasizes students' conscious awareness of themselves as the primary group, and inquiry-based learning is crucial for developing students' capacity for independent thought, stimulating students' innovative consciousness, and cultivating innovative ability.

### *3.2 AHP's Evaluation of Multimedia Education*

Western countries have long started the impact of multimedia education on students' learning and innovation. Although the status of multimedia education in the world has been widely recognized, the investment in schools is relatively large. The academic community hasn't been able to create an appropriate evaluation mechanism, thus it still follows the old teaching model in terms of teaching mode, content, methods, and means.

Building a more scientific and practical weight distribution model is crucial to raising educational standards because using existing evaluation methods for weight distribution is a very complex process[12]. Therefore, this paper adopts AHP to effectively solve this problem. Because AHP requires less quantitative data, which enriches the evaluation data, the evaluation results are more authentic and credible, as shown in Figure 1:

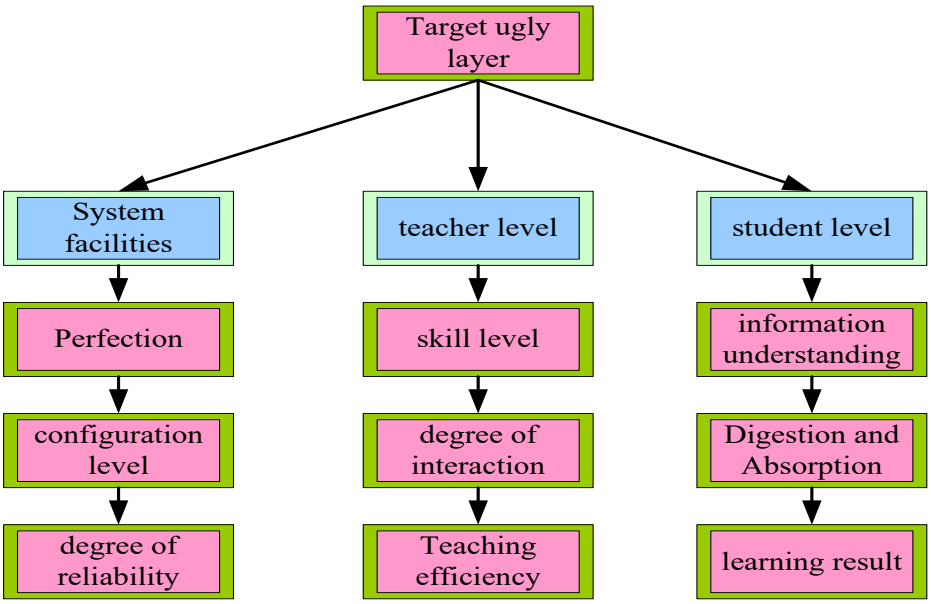


*Figure 1: Evaluation indicators of multimedia education*

As shown in Figure 1: The evaluation indicators of multimedia education include system hardware facilities, teacher level and student level. The hardware facilities of the system include the degree of perfection, the level of configuration, and the degree of reliability. The teacher level includes application proficiency, interaction degree, and teaching efficiency, and the student level includes information understanding, digestion and absorption, and learning effect.

In general, AHP can be divided into three layers: the top layer is the target layer, the middle layer is the indicator layer, and the bottom layer is the planning layer [13].

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Hierarchical sorting refers to the relative weight of each factor $a_{ij}$ in each judgment matrix, which is essentially the calculation of the weight vector. Normalize the consistency judgment matrix of each column, and obtain the corresponding weight $\omega_i$. Calculated from Formula (1):

$$\omega_i = \frac{1}{n}\sum_{j=1}^{n}\frac{a_{ij}}{\sum_{k=1}^{n}a_{kj}} \tag{1}$$

In practice, a consistency check is required to judge whether the matrix satisfies the general consistency. The logical soundness of the judgment matrix can only be confirmed when the general consistency is met, and only then must the analysis of the results be continued. Calculate the consistency index $CI$ as Formula (2):

$$CI = \frac{\lambda_{\max} - n}{n-1} \tag{2}$$

The largest eigenvalue is $\lambda_{\max}$, and it is crucial to use AHP to maintain the consistency of its judgmental thinking. The evaluation shows that the judgment matrix has good consistency. The consistency ratio CR is calculated using Formula (3):

$$CR = \frac{CI}{RI} \tag{3}$$

When $CR \prec 0.1$, the consistency of the judgment matrix can be confirmed, all indicators have been quantified, but they must be dimensionless due to their different units, such as Formula (4):

$$P_i = C_i / T_i \tag{4}$$

$P_i$ indicates the dimensionless index after index conversion, $C_i$ indicates the index value before index transformation, and $T_i$ indicates the reference value of the index. In order to determine the comprehensive value of the indicators of each benchmark layer, multiply the average score of each indicator under the benchmark layer by the relevant weight, as shown in Formula (5):

$$P_j = \sum_{i=1}^{m} c_{ji} \cdot v_{ji} \tag{5}$$

In the formula, $P_j$ is the comprehensive value of the benchmark layer indicators, j is its serial number, and m is the total number of single indicators included in the benchmark layer.

Finally, a comprehensive measure to measure the impact of multimedia technology teaching is determined, as shown in Formula (6):

$$R = \sum_{j=1}^{s} P_j \times b_j \tag{6}$$

The combined value of each benchmark level indicator below the target level is multiplied by its corresponding weight, and the results are added together. In the formula, $b_j$ is the weight value of the reference layer, and $R$ is the weight value of the reference layer.

The increase in the number of users of multimedia means an increase in a large amount of user-related data. All evaluations are analyzed by collecting user information. The more complete the data analysis, the more credible the conclusions are.

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## 4. Investigation and Discussion on the Influence of Different Educational Methods on the Learning Ability of College Students

### *4.1 Status Quo of Multimedia Education and Traditional Teaching*

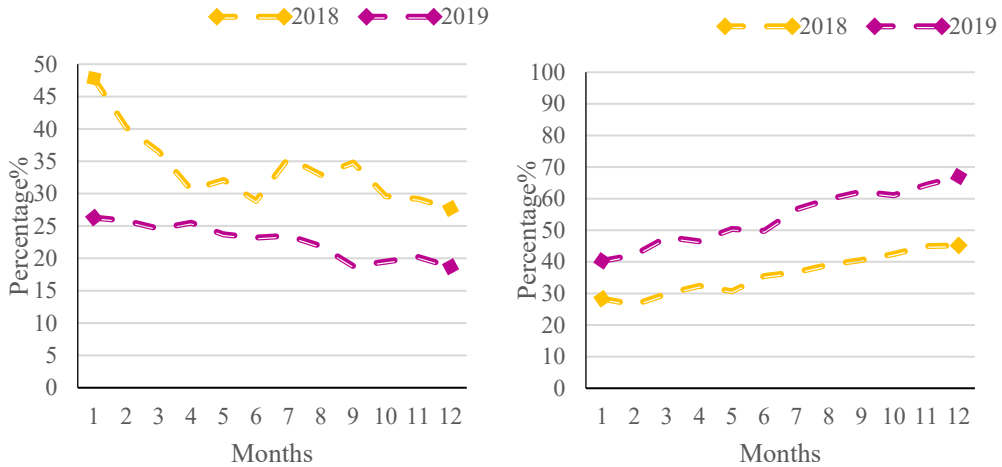
A novel teaching approach that differs from conventional teaching is multimedia education. It can effectively pique kids' interest in studying and advance their thought processes, so that they can truly become the creators of knowledge and the main body of information processing in their learning. Teachers have gradually transitioned from chalk classrooms to courseware classrooms, and this new teaching model has naturally entered the classrooms of major colleges and universities.

This paper conducted an experiment on 200 students from a university and divided them into two groups. Group A (100 people) conducted traditional teaching, and group B (100 people) conducted multimedia teaching for six weeks.

Compared with traditional teaching methods, multimedia education has great advantages in terms of large amount of information, vivid images, and broad knowledge. In recent years, Chinese colleges and universities have vigorously promoted multimedia classrooms, which have rapidly spread across the country. Some universities even take the utilization rate of "multimedia classrooms" and the ratio of "multimedia classrooms" as an important criterion to measure the quality of education. The development trend of traditional education and multimedia education in 2018-2019 is shown in Figure 2.

As shown in Figure 2: From figure (a), it can be seen that the overall development trend of traditional teaching from 2018 to 2019 is declining. Although there are fluctuations in the middle, it is not difficult to see that traditional teaching has not kept up with the pace of the times. In figure (b), it can be seen that the development trend of multimedia education in 2018-2019 is on the rise.

Students can learn new things in a variety of methods. In addition to helping students acquire fundamental concepts, the use of multimedia technology in the classroom fosters students' analytical and problem-solving skills, which help them create accurate understandings and develop healthy worldviews. The pace of technological advancement means that people's knowledge is ever-evolving and their capacity for learning is limitless. Therefore, cultivate students' learning ability and benefit them for life. The emergence of multimedia education enables students to acquire knowledge and master technology from passiveness, and promotes students' all-round development.




*(a) The development trend of traditional education in 2018-2019 (Left)*
*(b) The development trend of multimedia education in 2018-2019 (Right)*

*Figure 2: Development trends of traditional education and multimedia education in 2018-2019*

### *4.2 Frequency of Multimedia Use by Teachers and Attitudes of Students*

In this experiment, the frequency of teachers' multimedia education and students' satisfaction with multimedia education were investigated, as shown in Figure 3:

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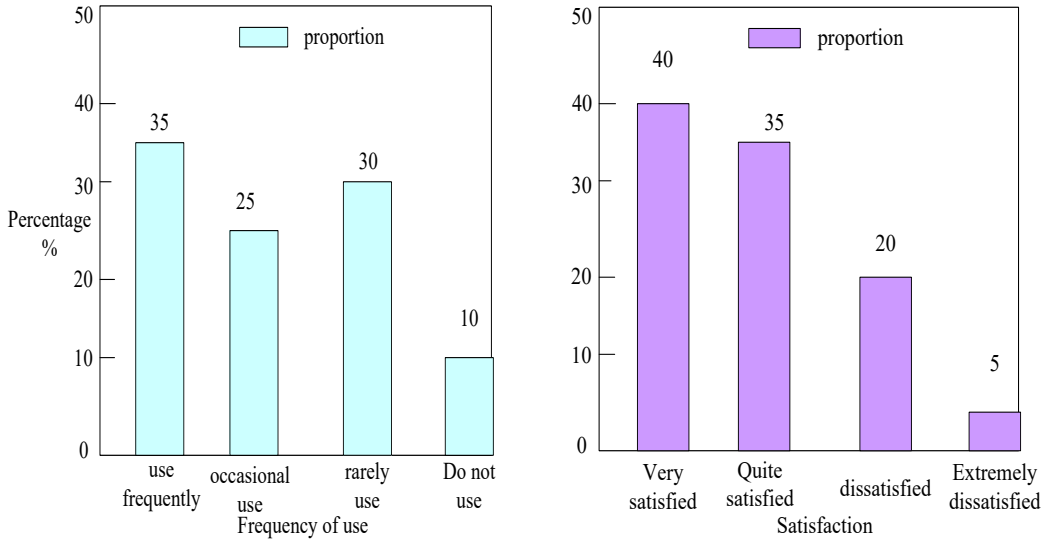


*(a). Frequency of multimedia education* *(b). Student satisfaction*

*Figure 3: Frequency of multimedia education and student satisfaction*

As shown in Figure 3: Figure (a) shows that in terms of the frequency of teachers' use of multimedia in education, 35% of students indicated that teachers frequently used media for teaching, 25% of students indicated that teachers occasionally used, 30% of students indicated that teachers rarely use, 10% of students indicated that teachers do not use. Figure (b) shows that in terms of students' satisfaction with multimedia education, 40% of students are very satisfied, 35% of students are somewhat satisfied, 20% of students are dissatisfied, and 5% of students are very dissatisfied.

The advantages of multimedia are not only reflected in the classroom, but also in the daily lesson preparation. Teachers can search for a large number of lesson preparation materials through the Internet, prepare lessons easily, and keep an eye on the latest technology updates and the latest learning resource dynamics. This clearly demonstrates a wide range of educational resources so that teachers can completely understand the lesson plans and instructional strategies in their own time, thereby raising the caliber of instruction.

### *4.3 Comparing the Comprehension Ability of the Two Groups of Students*

Numerous issues limit traditional classroom instruction. Only depending on teachers to explain the contents of books makes it difficult for teachers to teach and for students to learn. Due to the lack of understanding of the concept of space, many students are not interested in learning. With the advancement of technology, the use of multimedia has made classroom teaching more vivid, and multimedia can also be used to improve students' enthusiasm for learning in the classroom. The comprehension ability of the two groups of students before the test is shown in Table 1:

*Table 1: Comprehension of the first two groups in the test*

| Understanding ability | Group A | Group B |
|---|---|---|
| Very strong | 14 | 16 |
| Relatively strong | 19 | 17 |
| Generally strong | 22 | 24 |
| weak | 23 | 18 |
| Very weak | 22 | 25 |

As shown in Table 1: In the investigation of the comprehension ability of the two groups before the test, it was found that there were 14 people in group A with very strong comprehension ability, 19 people with relatively strong comprehension ability, 22 people with general strong ability, 23 people with weak comprehension ability, and 22 people with very weak comprehension ability. In group B, there are 16 people with very strong comprehension ability, 17 people with relatively strong ability, 24 people with general strong ability, 18 people with weak understanding ability, and 25 people with very weak understanding ability. Before the experiment, neither of the two student groups had particularly good comprehension skills. Table 2 displays the two groups' post-test comprehension abilities.

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*Table 2: Comprehension ability of the two groups after the test*

| Understanding ability | Group A | Group B |
|---|---|---|
| Very strong | 19 | 36 |
| Relatively strong | 21 | 30 |
| Generally strong | 15 | 14 |
| weak | 29 | 12 |
| Very weak | 16 | 8 |

As shown in Table 2: In the investigation of the comprehension ability of the two groups after the test, it was found that 19 people in group A had very strong comprehension ability, 21 people had relatively strong comprehension ability, 15 people had general strong comprehension ability, 29 people had weak comprehension ability, and 16 people who are very weak in comprehension. After the experiment, the comprehension ability of the two groups of students has been improved, especially the B group.

The form of multimedia is used to explain to the students in a timely manner, so that they can quickly understand and master it, which is much more effective than the previous imagination. It can be said that the extensive use of multimedia technology can not only improve the quality of the classroom, but also improve students' comprehension ability, so that students can acquire knowledge easily and happily.

### *4.4 Comparison of the Autonomous Learning Ability of the Two Groups of Students*

The intuitive and dynamic interactive way of multimedia technology gives students a larger learning space, making their learning more active in the classroom, and makes their teaching more vivid with the help of the rich audio-visual resources of multimedia technology. Abstract knowledge can be demonstrated clearly and concretely through courseware, and complex experiments can be reproduced through video. It would let students see no longer simple words and symbols, no longer empty textbooks, no longer rigid blackboards, but students' enthusiasm for learning, and their progress is taken for granted. Table 3 displays the two groups' prior levels of autonomy in learning:

*Table 3: Autonomous learning ability of the two groups before the test*

| Degree of initiative | Group A | Group B |
|---|---|---|
| Very proactive | 10 | 13 |
| Relatively proactive | 14 | 12 |
| Generally proactive | 18 | 21 |
| Not active | 22 | 20 |
| Very inactive | 36 | 34 |

As shown in Table 3: In the self-learning ability survey of group A before the test, the number of people who were very active in learning was 10, the number of people who were relatively active in learning was 14, the number of people who were generally active in learning was 18, and the number of people who were not active in learning was 22 people, and 36 people are very inactive in learning. In the self-learning ability survey of group B before the experiment, 13 people were very active in learning, 12 people were relatively active in learning, 21 people were generally active in learning, and 20 people were not active in learning, and the number of people who were very inactive in learning was 34. It shows that the students in the two groups before the experiment have no strong self-learning ability.

Table 4 displays the two groups' post-test levels of autonomy in learning:

*Table 4: Autonomous learning ability of the two groups after the test*

| Degree of initiative | Group A | Group B |
|---|---|---|
| Very proactive | 15 | 38 |
| Relatively proactive | 24 | 32 |
| Generally proactive | 26 | 19 |
| Not active | 17 | 6 |
| Very inactive | 18 | 5 |

As shown in Table 4: In the self-learning ability survey of group A after the test, the number of people who learned very actively was 15, the number of people who were more active in learning was 24 people, the number of people who were generally active in learning was 26 people, and the number of people who were not active in learning was 17 people and 18 people who study very inactive. In the

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self-learning ability survey of group B after the experiment, 38 people were very active in learning, 32 people were relatively active in learning, 19 people were generally active in learning, and 6 people were not active in learning, and the number of people who study very inactive is 5 people. It shows that the autonomous learning ability of group B has been greatly improved after the experiment.

### *4.5 Countermeasures to Improve the Learning Ability of College Students in the New Era*

(1) Strengthen the multimedia literacy education of college students

Strengthening the quality of education for college students is crucial given the widespread use of multimedia technologies in Chinese colleges and universities. Multimedia quality education is an education that guides college students to correctly understand and actively enjoy mass multimedia resources, so as to cultivate their sound awareness of multimedia criticism, so that they can better use resources to promote their own development.

(2) Change the traditional classroom teaching method

This new type of teaching environment mainly builds a relatively relaxed learning environment from the perspective of the humanistic environment, changing the previous "centralized" teacher education model. In the classroom, students are guided to use multimedia to obtain professional knowledge and information, so that students gradually enter the interest of professional learning and broaden their professional vision. It has changed the traditional method of relying on new knowledge imparted by teachers in the past. The knowledge and information gap between teachers and students can be bridged by students developing a command of the present state and future direction of their field with the aid of multimedia technologies.

(3) Infiltrate the cultivation of learning ability in subject teaching

First, the training goal of learning ability is established, so that learning ability and learning content are organically combined. Second, the enthusiasm of students to seek knowledge, think, solve problems, and pay attention to learning methods is stimulated, and students are trained to consciously explore learning methods and cultivate learning ability. Third, teachers personally demonstrate the relevant content of learning in class, or show students typical materials of learning ability, so that students with stronger learning ability can introduce their own experiences to the class and let students interact. Fourth, the situation is created to allow students to organize learning, acquire knowledge, apply knowledge, and develop knowledge ability in the classroom, so as to obtain better exercise.

## 5. Conclusions

Students' overall quality would increase as well as their ability to learn new material would be updated. The development of learning skills can successfully encourage students' knowledge acquisition and skill improvement. The conventional educational model has become obsolete, and multimedia education has given modern teaching new life and vitality. It can successfully enhance learning as well as increase the effectiveness of classroom instruction, it also has rich information resources and good teaching intuition. This paper used the AHP method to conduct multimedia education evaluation, gave full play to the hierarchy of various influencing factors, established a flexible and concise index system, and weakened the influence of human factors on the evaluation results. The survey results found that all educational methods are based on flexible teaching, and the basic goal is to cultivate comprehensive and innovative talents. In order to truly play the role of modern educational technology, people must strengthen the use and management of multimedia educational resources, and improve technical services and professional skills through continuous learning and exploration. The shortcoming of this paper is that there is no investigation and analysis of teachers in the experiment, and the scope of investigation should be expanded in future work.

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