Research on the Impact of Multimedia Computer-based English Teaching in High School

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Abstract—With the establishment of new curriculum standards, the study of English calls for "task based" learning. How to practically and effectively carry out reforms on English education and teaching in order to optimize the classroom teaching of this course, fully promote education for all-round development, cultivate the students for comprehensive language abilities and strengthen the guide on learning strategies as well as encourage them to develop their abilities for listening, speaking, reading and writing through experience, practice, discussions, cooperation, communication and exploration, has become key problems the teaching of English in high school that needs to be resolved urgently. Through the survey and research of the test materials, this paper offers some information about the outstanding advantages of multimedia computer-based classroom teaching by comparing with traditional teaching methods and provides empirical evidence for the effective application of modern teaching methods in classroom teaching.

Key words—Multimedia computer; High school education; English teaching; Evaluation Criterion

I. INTRODUCTION

The Computer Based Education (CBE) are commonly divided into two aspects related to software. One is the CAI (Computer Aided Instruction) which refers to the computer helping or replacing the teacher to perform part of the teaching tasks and impart knowledge to students and provide training on skills as well as offering direct services to them [1]. The other is EMI (Computer Managed Instruction) which means the programs for information management and processing that are specially designed and developed based on different purposes [2]. It can be used to manage and guide the teaching process and help the teacher construct tests and keeping grades as well as managing the teaching plans and teaching resources. In addition, it can also offer direct services to both the teacher and the education administrative department [3].

With the development of CAI and the wide application of CAI software, it has become a well-known term. It is not only an important teaching technology, but represents the vast application realms of the computer, including various applications that directly allow the computer to provide services for the teaching aims[4].

II. THE CLASSIFICATION OF COMPUTER BASED EDUCATION

The application of computers in education can be divided into the following three categories.

A. Computer as a Teacher

The traditional teaching method mainly depends on the experienced teacher imparting knowledge or skills to students [5]. And now the teacher can be partly replaced by the computer for teaching students, grasping skills and consolidating the knowledge learnt.

The development of scientific technology has enabled the computer, especially micro computers, to imitate the teaching actions which can partly serve as a substitute for the teacher. Although the computer cannot fully replace the teacher, it outperforms them in certain aspects [6].

As for the design of software that can work as a teacher, we need to pay attention to following aspects.

(1) Change the forced study into voluntary study

The development and design of CAI software must consider the feeling of the users and make use of various means to motivate their interests and change the forced study into voluntary study, as well as make the user feel relaxed and pleasant while using software to study [7].

(2) Necessary repeat

There is an idiom, "practice makes perfect" and much knowledge and many skills can only be mastered through repeated practice [8]. The development and design of CAI software needs to take advantage of features of computer based lessons by focusing on the differences of users and help them become accustomed to this kind of repetition which will further attain the goal of "practice makes perfect".

(3) Avoid tedium

Dull practice and forced patterns in study will not lead to good results. The computer is able to transform dull repetition into interesting and inspiring games, which makes the users concentrate on it to find hidden information in order to obtain high scores and quick response [9]. Many intentionally-designed exercises are proposed which encourage students to continue the game. A good program design can even make the dullest task witty and entertaining.

B. Computer as a Student

The computer as a student offers a scene and continuously creates new contents as the interactions are occurring. What the student encounters is never a narrow world with only one right answer, but the student can use the software tool or program to "teach" the computer to execute some special tasks as different modes occur and the meanings of a series of options relies on the information provided to the computer. From using the existing commercial software, the students can gradually learn one or several computer languages and even program it to solve

problems themselves. In seeking solutions for complex problems, the creativity of students can be fully engaged, which will have a significant influence on enhancing learning interests and cultivating the capabilities of analyzing and resolving problems.

C. Computer as a Tool

As a teaching tool offered to learners, the computer brings about great changes on teaching courses and contents as well as the methods. It is beneficial for developing intellect and cultivating the ability of solving problems by making students use computers to finish various kinds of learning tasks as much as possible. As a tool, the computer can assist students in completing special tasks, and offer an opportunity to conduct creative activities. Altogether, the application of computers in education has a wide range [10]. With its gradual promotion, people's understanding of traditional educational methods will be changed as well as the curriculum settings and teaching methods.

D. Computer as study condition

Traditional teaching theory may well explain the nature of human learning activities, but the imbalances have already posed great challenge to these traditional theories. This is mainly because the constituent elements of teaching have changed after the integration. The existing system involves not only the two aspects of teaching and learning, but also many other constituent elements such as technology, resources and so on [11]. Therefore, in order to find the causes and countermeasures of problems and recover dynamic harmony of the teaching system, we should re-examine our foreign language teaching from the perspective of using ecology based on the advantages of the traditional theory. In other words, in accordance with the principles of ecology and ecological teaching theory, we need a survey of the relationship between the internal constituents of the foreign language teaching system and the external development environment. The purpose of this is to explore features and functions of ecological foreign language teaching and analyze the basic law of its evolution and development, then carry out ecological attempts such as goal setting, teaching design, building teaching mode and others. Studies inside China of ecological foreign language teaching model from macro and micro aspects have achieved some research results. This author intends to provide specific strategies for optimization of patterns on the basis of empirical findings in this study, hoping to build more foundations for further studies in this field [12].

(1) Teaching environment

Foreign language teaching ecosystems identified environment as comprehensive, dynamic and balanced, which includes the natural social environment in which language learning occurs, and the psychological environment depending on the language learning process. Both sides would benefit or limit teachers and students from a different teaching environment. A good language environment can provide an ideal learning environment for teachers and students. A relaxed psychological learning environment can improve the efficiency of learning a foreign language Well-equipped facilities can ensure the efficient operation of the system, and so on. The idealized ecological teaching environment of foreign language in a computer network environment should be a harmonious ecosystem environment that is compatible with the teaching

elements, and can promote the healthy development of the community [13]. To identify the implied ecological imbalance of individuals or groups is one of the research tasks of this article.

(2) The role of students

The student is one of the main ecosystems who has great initiative and creativity. In traditional foreign language teaching and learning environment, the role of students in the classroom is mainly shown by their ability accept textbook knowledge, the extent of absorbing teaching content and participating in class activities. Foreign language teaching under the guidance of new information technologies in teaching has undergone great changes, which emphasizes the learning efficiency of students by using a network. But for various reasons some students lack the awareness and self-learning ability. In some cases, even a serious anxiety appears in the process, which is another task of this paper; i.e., to start the ecological research on ecosystem development disorders in the teaching of individuals.

(3) The Role of Teachers

Teachers, including teaching assistants are another subject in teaching ecosystem who have initiative and creativity [14]. In traditional foreign language teaching environment, the main role of teachers is very obvious, reflected in the decision of classroom teaching contents and processes as well as on directing students' motivation and activities. New information technology coming into the foreign language classroom has greatly impacted the traditional teacher-oriented teaching form. How to improve information literacy of teachers to enable their rational development and utilize modern educational technology resources, to enhance learning ability of students under the network environment, so as to maximize teachers' leading awareness and ability in the entire teaching process, is herein another main task of this study and solving the ecosystem imbalance [15].

III. COMPARISON BETWEEN COMPUTER BASED EDUCATION AND TRADITIONAL EDUCAION

A. Experimental Subjects

(1) The host, Mr. Xu [16], is an English teacher of senior two in the second high school in Changchun, has a college degree from the School of Foreign Languages of Jiangxi Normal University. With practical teaching experience of 4 years, he is familiar with CBE and shows enthusiasm for this teaching experiment. Meanwhile he acts as the English teacher for both the experimental class and the contrast class

(2) There are 50 students respectively in class 4 and class 5 of the second grade of the second high school in Changchun to act as subjects. Class 5 serves as the contrast class and will be taught in a traditional way without CBE, and class 4 is the experimental class with CBE. The English level between the two classes is almost the same belonging to the medium level among the second grade before the experiment.

B. Experimental Methods

(1) The contrast class adopts the traditional teaching methods. In the classroom, we explain the articles by a traditional recorder blackboard and grammar-translation method [16]. The teacher will lead the students to read the new words in order to make sure they grasp the accurate

pronunciation. Then it comes to the explanations of difficult words, grammar, key phrases and structures and many examples will be used for illustration. The teacher will again translate every sentence of the article so that the student can get a more accurate and deeper understanding of every word and sentence in it. The main task in the classroom is to listen carefully and take regular notes and practice Chinese-English or English-Chinese translations on the sentences in the book or the examples proposed by the teacher, and sometimes the student will answer the questions raised. That is, the classroom teaching activity is conducted with the teacher as the center and the student must closely take in the knowledge taught by the teacher. Under this method, the student has fewer opportunities to take part in the teaching activities, so only a few can participate. Most of them are afraid of speaking for the fear of making mistakes or due to a poor foundation. The homework is the exercises in the book which are mainly to consolidate the words, phrases and sentences learned. The chances for students to speak or refer to materials are rare, and all of these tasks are performed by the teacher.

(2) The experimental class is taught through CBE. In this mode, the teacher plays two roles. One role is promoter, who makes activity plans, designing teaching tasks and distributing roles in order to ensure the teaching tasks being completed as scheduled. Tthe other role is participant, who joins the activity as a student and timely finds problems during the process of finishing tasks and then offers appropriate guidance. As an assisted teaching tool, the multimedia computer should be equipped with online classroom, panel discussion area, free discussion area and online answering system, and so on. ① Online classroom: Based on this, the teacher can conduct course maintenance and teaching and release the syllabus, offer detailed rules for implementation of teaching, teaching contents of every chapter or section (CAI courseware), key points, references and exercises online for students to learn. ②Panel discussion area: The teacher can guide the students on how to capture topic sentences, key words and signal words during the listening comprehension process in order to summarize the content of the article. Additionally, he can set up several discussion topics based on the key or difficult points in the teaching process to lead the students to think and explore as well as cultivate their capabilities of considering and finding solutions to problems. ③Free discussion: The students can carry out free discussion on the study of the course and exchange what they have learned and their learning experience. They will conduct mutually-aided learning by mutually helped or learned by each other For example, the desk mate can form a pair to conduct oral practices on the topics given by the teacher. ④ Online answering system: The students can ask for the teacher's help with difficult questions and carry out real-time or non-real-time conversation with the teacher based on their learning background. In this way, the goal of individualized education can be reached and thus activate the students' passion for study and inspire their learning potential to the maximum extent.

C. Evaluation Criterion

The measurement of the effect of classroom teaching cannot be based on the school records alone, but should comprehensively consider the circumstances of intelligence and other non-intellectual aspects. As the subject of study, the student is the direct perceiver of the teaching effect, so the test on the effect of classroom teaching should gauge their understanding and requirements. Thus, we have formed common indicators reflecting the effect of classroom teaching and conducted a semi-closed questionnaire on these indicators. We choose the first 9 items with a high identification rate (above 50%) from the 300 recycled questionnaires as testing materials, which are respectively as follows.

Learning interest refers to what extent the teaching can motivate students' interests in learning.

Learning efficiency means the teaching can make students grasp the study contents rapidly.

General effect refers to the total impression of teaching.

Inspiring mind refers to what extent the teaching can inspire an active mind.

Oral expression means the teaching can improve the oral communication abilities of the students.

Grasping key points means the teaching makes the key points stand out and are easily mastered.

Writing expression: refers to what extent the teaching can improve the writing level. Improving listening refers to the listening ability can be improved by teaching;

Concentration means the teaching can get the students' focus and attention and make them concentrate on study.

D. Statistics of Test Results

After the two classes abandon the multimedia CBE for two weeks, then we carry out the first survey with our test materials. Tables 1 and 2 show the assessment of each indicator of teaching effect and the comparative analysis on the students' attitude towards study either before or after the test.

Because the school record is an important indicator reflecting the effect of classroom teaching, we carry out two tests among the students. One is the test on the first four units of the first volume of senior two English before the introduction of multimedia CBE in the experimental class. The other is the test on the contents from unit 5 to unit 10 of the first volume of senior two English. Table 3 shows the mean record.

IV. ANALYSIS OF TEST RESULTS

The mean values of the tests can be obtained according to the comparison between the experimental class and the contrast class, as shown in Table 4. It refers to the two classes testing materials and the application of a quantitative method as regulated leading to the mean values of the tests.

A. Total Mean Value

Table 4 shows the total statistical result of a large number of testing samples (n>30) in the two tests by adopting the comparative method of a single group experiment and an identical group experiment. See Table 5.

TABLE I.
TWO CLASSES LEARNING ATTITUDE CONTRAST ANALYSIS BEFORE EXPERIMENT

	Experimental class				Contrast class			
	Very good	good	general	bad	Very good	good	general	bad
Interest in learning	7	19	18	5	5	18	20	6
The learning efficiency	5	23	19	4	3	20	25	8
The comprehensive effect	14	24	17	3	10	21	26	6
Inspired thinking	6	19	13	9	6	16	28	14
Oral English	3	19	16	6	1	15	19	9
To master the key	6	26	10	2	5	20	15	6
Written communication	8	29	14	1	3	23	19	5
Improve your listening	9	19	12	7	7	17	13	9
Focus on study	3	20	12	3	2	12	16	3

TABLE II.
TWO CLASSES LEARNING ATTITUDE CONTRAST ANALYSIS AFTER EXPERIMENT

	Experimental class				Contrast class			
	Very good	good	general	bad	Very good	good	general	bad
Interest in learning	26	16	9	4	12	22	12	9
The learning efficiency	25	15	6	5	13	14	22	6
The comprehensive effect	8	23	3	4	19	19	23	7
Inspired thinking	26	19	9	5	20	12	24	5
Oral English	20	22	3	6	19	23	15	9
To master the key	13	18	6	3	14	26	27	8
Written communication	36	9	5	5	9	17	16	7
Improve your listening	26	11	11	6	17	19	5	6
Focus on study	20	18	16	4	5	20	5	6

TABLE III.
AN AVERAGE ANALYSIS OF TWO CLASSES BEFORE TEST AND AFTER TEST

	Before test	After test
Experiment class	104.58	96.23
Compared analysis	99.25	88.98

TABLE IV.
THE AVERAGE FOR EVERY ELEMENT OF TWO CLASSES BEFORE TEST AND AFTER TEST

			Interest in learning	The learning efficiency	The comprehensive effect	Inspired thinking	Oral English	To master the key	Written communication	Improve your listening	Focus on study
Experimental class	Before test	Average	70.8	70.2	71.2	72.3	69.2	79.3	70.4	70.1	70.1
		Standard value	18.6	19.3	18.6	21.6	20.1	15.4	16.2	16.3	16.5
	After test	Average	77.1	78.9	78.6	74.3	84	78.3	70.1	85.4	74.3
		Standard value	18.3	18.6	19.6	19.3	14.2	14.9	26.3	12.6	69.2
Compare class	Before test	Average	66.9	70.2	71.2	70.1	68.3	69.2	74.1	65.4	19.3
		Standard value	17.2	18.6	19.3	18.4	21.3	21.5	18.6	18.4	70.1
	After test	Average	67.2	69.8	72.3	71.2	70.1	78	71.9	68	79.4
		Standard value	18.9	18.4	18.6	19.3	16.3	21.9	18.4	17.6	19.4

TABLE V.
TOTAL AVERAGE COMPARISON OF BEFORE TEST AND AFTER TEST

		Before test	After test	Z value	Significant values P
Experiment class	Total average	72.3	77.2	1.92	Near 0.05
	Total standard value	18.6	18.5		
Comparison class	Total average	69.2	70.3	0.16	>0.05
	Total standard value	18.6	18.2		
Z value		0.62	2.19	If P<0.05 is significant difference If P>0.05 is insignificant deference	
Significant values P		>0.05	<0.05		

TABLE VI.
SINGLE AVERAGE COMPARISON OF BEFORE TEST AND AFTER TEST

		Interest	The	The compre-	Inspired	Oral	To	Written com-	Improve	Focus
Before test	Average	70.8	70.2	71.2	72.3	69.2	79.3	70.4	70.1	70.1
	Standard	18.6	19.3	18.6	21.6	20.1	15.4	16.2	16.3	16.5
After test	Average	77.1	78.9	78.6	74.3	84	78.3	70.1	85.4	74.3
	Standard	18.3	18.6	19.6	19.3	14.2	14.9	26.3	12.6	69.2
Z value		2.82	2.28	1.59	1.18	4.25	1.69	1.50	1.26	7.3	0.69
Significant		<0.01	<0.05	>0.05	>0.05	<0.01	>0.05	>0.05	<0.05	<0.01	>0.05

TABLE VII.
AVERAGE COMPARISON OF BEFORE TEST AND AFTER TEST

		Interest in learning	The learning efficiency	The comprehensive effect	Inspired thinking	Oral English	To master the	Written communication	Improve your listening	Focus on study
Experimental class	Average	77.8	70.2	75.2	72.3	69.2	79.3	70.4	70.1	70.1
	Standard	18.6	17.3	18.6	21.6	20.1	15.4	16.2	16.3	16.5
Comparison class	Average	67.1	78.9	78.6	74.3	84	78.3	70.1	85.4	74.3
	Standard	18.3	18.6	19.6	19.3	14.2	14.9	26.3	12.6	69.2
Z value		4.03	2.4	1.52	1.26	4.25	0.84	1.26	1.36	8.36	1.05
Significant		<0.01	<0.05	>0.05	>0.05	<0.01	>0.05	>0.05	<0.05	<0.01	>0.05

TABLE VIII.
STATISTICAL ANALYSIS OF THE TWO CLASS

		Before test	After test
Experiment class	Average	104.2	95.6
	Standard value	12.3	22.3
Comparison class	Average	99.2	89.4
	Standard value	15.2	12.3
Value of Z		1.23	0.96
Significant value P		>0.05	>0.05

TABLE IX.
COMPARISON ANALYSIS OF THE TEST RESULT OF TWO CLASSES

		Before test			After test		
		Top student	Middle	Underachievers	Top stu-	Middle	Underachievers
Experiment class	Average	123.6	104.3	72.3	132.5	101.2	65.3
	Standard	4.25	4.25	9.54	6.35	8.26	19.3
Comparison class	Average	126.5	106	70.9	127.3	101.3	57.4
	Standard	4.25	4.12	7.36	6.2	8.25	20.4
Value of Z		0.85	0.06	0.45	0.78	0.98	1.36

Table 5 shows, as for the single group experiment, the statistical evaluation result of the total effect mean value of the contrast class in the two tests is z=0.14, which is less than 1.96 (Significance level is 0.05) and shows no significant difference (P>0.05). The statistical calculated Z value of the experimental class in the two tests is 1.93, which is the approximate threshold of significant difference (l.96), so it does have important differences. As for the identical group experiment, the total mean values between the experimental class and the contrast class in the first class shows no significant difference (P>0.05). However, the second test result was just the opposite (P<0.05).

B. Individual Mean Value

As Table 4 shows, the mean values of the contrast class in the two tests and the mean values both of the contrast class and the experimental class in the first test, changes little on each indicator in the test and lacks any remarkable differences (statistical calculation P>0.05). However, the mean values of the experimental class in the two tests and the mean values of the contrast class in the second test show certain changes. See Tables 6 and 7 for the results of statistical calculation

As shown in Tables 6 and 7, after the introduction of multimedia CBE, certain indicators in the test display remarkable improvement (P<0.01or P<0.05), such as the learning interest, study efficiency, oral expression and listening improvement, which indicates that the multimedia CBE makes the teaching content be filled with creative expression and appeal to students.

It is easy to stimulate the students' learning interest and improve their learning efficiency through its optimization

and application of sound, images, music, colors and vivid communication scenes, which is beneficial for the attainment of knowledge and the cultivation of listening and speaking abilities. As for the indicators, it offers certain insight on the mean values of general effect, inspiring mind, written expression and concentration which had surpassed the traditional method, but the difference is not so evident (P>0.05). However, as for the indicator of the mean value of grasping key points, the statistics indicate a decrease in effectiveness than the traditional education. Thus it can be seen that the multimedia CBE can achieve better effect in general but not on all aspects, and its impact also consists of good, preferable as well as not good. The research on the effect of CBE is to learn its specific functions and then effectively put it into teaching practices to offer services for education.

C. Comparison of School Record

Based on Table 3, the statistical result can be obtained by the scores of the two tests for the two classes in the two tests, as in Table 8.

From Table 8, the Z value obtained under the same score system from the two tests between the experimental class and the contrast class merely shows obvious difference; namely, the introduction of multimedia CBE will neither improve the school record of the experimental class nor decrease it. This means the effect of multimedia CBE on school records is as good as the traditional education. If we separate the groups on the basis of scores, those whose scores are above 120 points (150 points in total) are considered top students, those whose scores are between 90 and 119 points (150 points in total) are medium students and those whose scores are below 90 points (150 points in total) are considered underachievers.

Table 9 shows that the average score of underachievers in the experimental class is 1.9 points more than that in the contrast class and the value of Z is 0.41, which does not reveal a large difference But after the introduction of multimedia computer based instruction, the average score of underachievers in the experimental class becomes 11.1 points higher than that in the contrast class, with its Z value of 1.62 which demonstrates a large difference. So we can conclude that the CBE is clearly effective on underachievers.

V. REASON ANALYSIS

The new computer network teaching environment requires teachers to timely change teaching concepts and adhere to the student-centered teaching philosophy, to serve as a researcher of learning needs, a take a leading role in the overall direction of the study and being a supervisor of the activities. Teachers need to assist students to achieve the transition to a network of classroom activities and enhance their independent learning abilities. However, research statistics (see Table 4) show that in the average attitude of teachers, only 47.6% and 44.3% of them respectively guide students in the multimedia classroom and network of independent learning. From this, we see that more than half of the teachers almost neglect their own rightful leading role. If there is not reasonable ability to design classroom activities, students will not be provided active feedback and conscious thinking opportunities, and teachers will not be able to effectively mobilize the enthusiasm of students. At the same time, the survey (see Table 5) also shows that as many as 43.6% and 47.3% of

students were evaluated as on the edge and passive recipients in network multimedia classroom activities and autonomous learning process, resulting in many problems such as lack of taking a principal role in their own learning, unclearness of individual needs, poor decision autonomy arrangements and passively acceptance in the learning process. Even 34.7% of students were evaluated as network information strays, whose learning effects are even worse.

Teachers' information literacy is a key factor in the promotion of computer network technology and foreign language curriculum integration. Students' evaluation for the teacher's application of computer networks is the most telling. A survey (see Table 6) shows that more than half of the students held a positive attitude to the teacher's network education literacy, but there is also another set of student evaluations showing the weakness of teachers' literacy. For example, in a network of students self-learning classroom, 38.2% of the students think their teachers have guidance and monitoring abilities, while 16.5% consider these abilities as bad. In the teachers classroom-based multimedia presentation, 25.4% of the students believe that teachers computer's operating capability is not strong, and even 19.4% of students believe that teachers' role in this regard is weak. Combined with the results of in-depth interviews, we can conclude that the weakness of a teacher's computer skills is mainly reflected in presenting courses, CD demos, machinery troubleshooting and so on. When asked if the using the media could improve the student evaluations of teachers, 39.2% of the students believe that the effect may be general, while 12.1% of the students believe that there is almost no effect. From the above analysis, the information literacy of college English teachers needs urgently to be strengthened.

VI. CONCLUSIONS

After two years of working on this study, this author finally completes it and finishes the paper. The whole work of exploration includes several phases which are specializing in theory, literature review, empirical research, and data analysis and policy research. The aim of the thesis is to promote the development of eco-college English teaching by optimizing the ecological teaching module in a computer network environment. In the process of the study, this author carried out a detailed study in various stages of research, and some new findings have been made.

Meanwhile, for the scope and performance of disorders, this author made an in-depth analysis by using relevant principles and rules of education ecology, and has basically determined the main reason for the problems arising. The emergence of information technology in the education field brings both opportunities for the development of modern teaching, and an imbalance in the original stability of college English teaching ecosystems. In the species niche competition between old and new, only by cooperating and adapting can they achieve the overall system functions and healthy development of college English teaching. Next, he proposed to build a computer network and envisaged optimization under the ecological environment of college English teaching mode; namely from the perspective of educational ecology theory and which is "compatible, dynamic and healthy" for the development of the optimization principle for construction. The appropriate choice of teaching theory and strategies is the best ecolog-

ical teaching mode to guide and improve the whole system. Under the niche theory and the theory of co-evolution, thi author proposes a teachers dominated - students subject hybrid teaching model which combines with the actual school subjects, and currently available pattern types for the teaching of general colleges or universities

Through the multimedia computer based education experiment lasting for almost a semester, the following facts have been proved:

(1) Multimedia based education can trigger the learning interests of students. With remarkable differences, it can also improve their listening ability and oral proficiency as well as study efficiency which have outperformed the traditional education.

(2) Without outstanding differences, it appears to be better than the traditional education on these aspects, including the general effect of study, inspiring their minds, improving their writing levels and the attention paid on study.

(3) It seems to be inferior on grasping the key teaching points, but there are no sharp differences between it and the traditional education in this regard.

(4) Generally, it performs as well as the traditional education on school record and appears to be more effective for poor students.

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