Applied Modes and Current Problems of e-Learning in the Primary and Secondary Schools of China

Pin Gong

***Abstract*—Technological development makes it possible for construction of the learning society and lifelong learning. In China, e-learning has been applying in basic education as an assistant method more or less and changes the traditional primary and secondary school education. The study focuses on its development and how it is applied in the primary and secondary classroom teaching and analyzes the existing problems, the characters and the restricted factors in its application. Among the three existing applied modes, assisted mode, substituted mode and blended mode, the assisted mode is most widely used in Chinese basic education. Those network schools surviving in the fierce competition support the application of the assisted mode. The factors like the extra financial burden, the efficient involvement of parents and the conflict between the limited after-class time and the large body of learning contents impact on the quality of e-learning in such mode. Enhancing the teachers' abilities of e-learning and increasing the in-class teaching quality could be a potential shortcut.**

***Index Terms*—E-learning, primary and secondary school, classroom teaching, applied mode.**

I. Introduction

With the technological development and growing network awareness, people are more likely to turn to the internet for querying information and acquiring knowledge. With the help of the huge internet resources, they experience learning and know the world. In the broadest sense, "E-learning", as a subconscious behavior, is common in the modern life.

The letter "E" is interpreted as "electronic", "experience", "exploration", "ease of use", "effective", "extend", "engagement" and "extension". From the point of education, e-learning is actually an effective and deep integration of information technology and subject curricula [1]. It would promote the students' exploring spirit and research level.

In the west world, the importance of its application in their basic education has been realized. Richard W. Riley, the former education secretary of the United States pointed out, " it (e-learning) is not an issue about technology but an issue about whether our children own opportunities" to have better education [2].

Till now, e-learning is not anything new. The idea of "lifelong learning" has been accepted by more people. In China, what is the current status of e-learning application in primary and secondary schools? What problems exist in practice? The study aims to provide some insights into characteristic of e-learning in basic education in China.

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II. Research Background

The author searched journal articles and thesis by the key word "e-learning" in China Knowledge Resource Integrated Database (CNKI), ranging from 1998 to 2013 and found out the development of research and study on e-learning in China.

In China, the research on e-learning started from 1999, when 3 articles about Cisco Asia Pacific Training Partner Conference was published on *Computing IT Week*, introducing a brand new training system which is combined with web technology completely to provide customers and staff members with convenient, fast but low-cost training [3]. That is "e-learning". It was also the first time to introduce network educational system to China.

In 2000, eight articles about e-learning were published in journals and newspapers. The authors identified the new concept and introduced related theories, predicting e-learning would provide new paradigm and vast prospect of its application for great innovation in traditional school education.

In 2001, the total number of the published articles rose up to 46. The publications range from newspaper to academic journals. Most of them are in the field of computer technology. Borrowing experiences from foreign e-learning training system, some online educational companies were established. As a try, the case-based teaching in teaching reform, e-learning was applied not only in the staff training but class teaching in colleges.

From 2002 till today, the articles and research on e-learning keep emerging with the speed of hundreds annually. The authors did further study in their master's thesis instead of the introduction of e-learning, such as its definition, connotation, translation, characteristics and changes it caused as results of the innovation. As far as the content concerned, most of research focus on what the e-learning is, how to design and construct e-learning plat and what new technology could be applied in the e-learning training system. Especially recent years, many master's thesis are devoted to the topic, the design and application of the new technology such as data mining, personalized recommendation model, Asp and semantic net in the development of e-learning system.

Generally, the more application and research on e-learning were done in the higher education, adult continuing education and professional trainings for the staff members than the basic education. The number of the published

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articles searched by the key words, "e-learning" in China Knowledge Resource Integrated Database (CNKI) is 4,585 whereas 52 of them discuss about e-learning applied in the basic education, taking only one percent. It could be inferred that basic education is the weakest link of e-learning application.

III. Understanding of e-Learning

Combining the perspectives and definitions from *The National Educational Technology Plan* and *Educational Technology White Papers* issued by the U. S. Department of Education in 2000, H. K. He, professor in Beijing Normal University, defines e-learning as following: "e-learning is an activity of learning and teaching through internet or other electronic or digital learning materials. It is a brand new method of learning, which fully uses the online learning environment with huge resource and open communication mechanism supported by modern information technology; e-learning will change the functions of teachers and the relationship between students and teachers in traditional teaching and have a big impact on teaching structure and essence of the education" [4].

It is defined as a process of learning in the electronic way, in which the learners study in the electronic learning environment with electronic learner resource by Li [5].

Counselor of Taiwan's institute for the information industry, Zou rejects to equate e-learning with network training or online training. Instead, he insists that both online and offline learning activities belong to e-learning as long as the learning material is electronic and could be gained on internet [6]. In addition, some scholars equate e-learning with network-based learning or all kinds of learning based on electronic technology.

It is not hard to find that the scholars in different fields have their own perspectives and expectation on e-learning. Due to their research background, the functions of e-learning are emphasized. Training company emphasizes on the application and implementation of a technology to design and transfer network training courses with the goal of improving the flexibility of the training, reducing the training costs and enhancing the connection between the individual and the organization. The scholars in the field of high education expect to improve the quality of education and strengthen the university's competitiveness with the help of information technology. As a result, some learning support centers, and digital resource bases emerged. Network universities were established to extend distance education. For the basic education, the learners are children aged from seven to sixteen. Diversity of integrated courses and more interactive and interesting video experience online are better for them to cover the shortage of traditional classroom teaching and to pursue the excellent result. Meanwhile, the teaching objects between the ages of seven and sixteen need more guidance while using an open learning environment. Therefore, the supporters of humanistic education theory believe that learning is more important side in e-learning, compared with electronic technology [7]. Simple application of technology on the surface level does not make any change on traditional teaching method and learning style. In another words, the learning supported by technology could not be called e-learning in any real sense unless the new teaching goal of an innovation is achieved. That is to say, e-learning is different from traditional learning due to the theory and view of learning and shift in attitude and perception on learning. Based on the particular technology, some similar concepts emerged, such as online learning, web-based learning, distance learning, blended learning, mobile learning, and ubiquitous learning. They are different but have something in common. The most remarkable common feature is that they help the learners to improve intellectual skills through electronic media.

WR Hambercht Company clarified the relationship among online learning, web-based learning, e-learning and distance learning in 2000. Online learning is a part of web-based learning which belongs to e-learning while distance learning is a wide field, including the first three kinds of learning [8].

In a word, e-learning is not long an associated teaching aid but a deep integration of information technology and course. There exists a remarkable shift in learning goals, content and environment, associated with modern information technology, communication mechanism and huge online resource.

IV. Basic Education in China

China set up nine-year compulsory education system. To ensure its legality, the law of compulsory education and the compulsory-education implementing detailed-rules was issued separately in 1986 and 2006, which confirmed the financial source of basic education. According to the tenth article in the law, the state shall not charge tuition for students who receive compulsory education, which makes it possible that all the children have chance to be educated, especially for those who has poor family back ground. By the end of 2008, the free nine-year compulsory education project had covered more than 96 percent of all ethnic counties. Teachers colleges as a part of normal education are responsible to train teachers for the full implementation of the nine-year compulsory education. Until now, nine-year compulsory education is basically popularized and succeeds eliminating the illiteracy among the youth and middle-aged people in China.

Generally, Chinese children study in primary school for 6 years and secondary school for another 3 years. The courses range from Chinese, math, English, geography, English, history, chemistry, physics to music, arts and P. E. ---almost every aspect of the basic science is offered. The class load is too demanding. Since the end of last century, ministry of national education has started pushing forward with the quality-oriented education, primary schools do not rank students only based on test scores. But under the pressure of the senior high school entrance examination and the college entrance examination few years later, Chinese, math and English are considered as more important than other subjects from primary schooling.

Besides, under the influence of the informational and economic globalization, bilingual education was valued all over the world since 1980s. In the middle of 1990s, study and practice of bilingual education were conducted in the primary

and secondary schools in the first tier cities such as Shanghai, Beijing, Guangzhou, Shenzhen, Ningbo and Xi'an. However, some problems were existed. In China, English as second language and the cultural differences result in the shortage of bilingual environment and bilingual textbooks. Potential competent bilingual teachers are confined to those with double degrees, one of which is in English. Bilingual instructions are more focused on the activity and professional courses such as painting, music, P.E. and informational technology [9]. It is much more efficient and feasible to achieve the teaching purpose of acquiring knowledge from natural sciences, literature and history through English language by e-learning in or after class.

V. Applied Modes of e-Learning

Aimed to improve teaching quality and learning efficiency, e-learning is applied in basic education and offers more opportunities of learning for the students. According to the effects of e-learning applied on traditional school education and the relationship between its application and traditional classroom teaching, the application of e-learning in school teaching are had in the following three modes, which is due to the educational environment, the needs of individual learners, course content, resources and the hardware devices and facilities involved. They are assisted mode, substituted mode and blended mode.

A. Assisted Mode

In assisted mode, e-learning is only used to improve the effect and quality of the classroom teaching with the help of some expanding courses, teaching support and diverse teaching resources offered by e-learning. For instance, the teachers provide electronic learning material related with what the students will learn in class before teaching, list questions or set up the task for pre-reading before class. After class, the teachers arrange assignments and connect with parents on the line. Diverse forms of e-learning recourse are helpful to motivate the students' study initiative and expand their views but not shortening the learning time in classroom. As a result, assisted mode is the most widely used in basic education at present.

Many schools created web pages and connected them to the campus network. They are not for distance education but for an internet discussion forum, where discussion about the course contents, key point hints, new messages, reference book, model shows, web page links or test question database is provided. The students tend to learn with the help of e-learning after class or at home. In such mode, the face-to-face classroom teaching is still the main way to acquire new knowledge for the students. E-learning is a supplement to the regular curriculum. The students and teachers have to use leisure time to learn more and communicate with each other, spending more additional time and energy. Considered as sure to improve teaching effect, assisted mode is accepted by most teachers and even a mainstream mode in the current basic education in China.

For most schools, assisted mode is also more likely to practice. It is not necessary to invest heavily on the hardware and infrastructure or transform the classroom teaching environment. Instead, only software and system platform updates could make it possible to achieve school teaching assisted with e-learning.

Extracurricular network tutorial learning and assistant connection between teachers and parents play as a role of an aid to regular classroom teaching in assisted mode.

On one hand, assistant learning platforms based on e-learning are built in some primary and secondary schools. Instead of developing their own learning platforms independently, most schools introduced e-learning products such as Web CT, Blackboard or some open source software such as Sakai, Moodle, Bodinton and Atutor, among which Moodle is most widely applied by the primary and secondary schools in coastal cities like Shanghai, Shenzhen, Guangzhou and is called as " magic light" kindly by teachers. Its powerful functions support and assist the teachers to create and develop on-line courses on many aspects, from curricular content's arrangement, test design, teaching evaluation, teacher-student interaction to rich resource, arrangement and organization of learning activities [10].

Besides, many schools cooperated with China Mobile and China Unicom, the two major telecommunications operators, to build a new platform for communication between schools and homes and achieve the goal of auxiliary of school education. S-F Communication is a successful case from China Mobile.

Moreover, the software and e-learning products such as Homework Support Programs, Teaching Plan Tool, Online test paper bank and the common on-line software for communication such as e-mail, BBS, Blog, are introduced and involved into the applied mode of e-learning.

On the other hand, network schools make it possible to provide the instruction after class as a good complement to the regular schooling and meet the academic educational need that conventional education cannot meet.

Since 101 network school, the first network school in China was build in 1996, the network schools aimed at primary and secondary school students have sprung up. Among them, Beijing No. Five Middle School Network School, Huanggang Middle School Network School, Beijing No., Four Middle School Network School and Jingshan Middle School Network School are the most outstanding.

In China, the number of net schools for primary and secondary school students shrank by 80%, from 1000 to 200, in five years, from 2001 to 2005 [11]. Those who cooperated with the key middle schools or universities with good reputation like Tsinghua University, Peking University survived, with the help of their high quality teaching, comparatively low costs and various ways of profit-making. Based on the experienced teachers and online course services from these famous primary and secondary schools, these network schools synchronize with school teaching. The students from common schools have chance to be guided and taught by the most excellent teachers from famous schools and even improve their academic career.

In a word, in the assisted mode, e-learning does not make any change or have a profound influence on the traditional classroom teaching, but helps to achieve the teaching goals of the conventional education by after-class aided instruction.

The relationship among e-learning, teaching objective and classroom teaching is shown in Fig. 1.

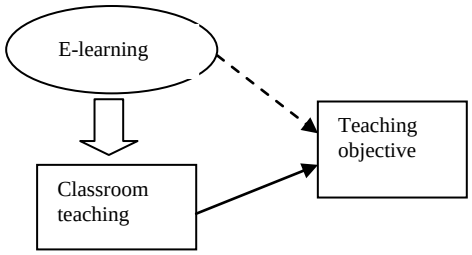

Fig. 1. Assisted mode of e-learning.

B. Substituted Mode

In substituted mode, e-learning takes the place of conventional classroom teaching completely or partly. However, e-learning is hard to displace the conventional schooling completely, especially on the level of basic education. Distance education is more applied in high education and also grants diplomas to those who have no more time to have regular campus life but still are willing to pursue further education. According to those subjects such as experimental courses that are limited to practice teaching because of the lack of hardware facilities, virtual classroom and online courses providing the synchronous or asynchronous distance learning make it possible to replace with face-to-face classroom teaching [12].

Take the real animal anatomy experimental teaching as an example. Experimental practice is a part of biography teaching. The students could benefit from real animal experiments which cost a lot. Because of the shortage of experimental fund, some experiments have to be canceled. With the aid of virtual classroom, part of real animal anatomy experimental teaching could be had on computer not in the labs. Froguts, an e-learning company devotes into producing the internet virtual labs. On its web site (http://www.froguts.com), there are virtual anatomy experiment on frogs, sleeve fish, star fish and other virtual animals. The software simulates the frog and fish anatomy experiments. Virtual anatomy tools, virtual anatomy situation, and vivid video games could meet the need of the students' sensory stimuli and help them understand structure of animal internal organs better. Because it has the function of video games, the students would like to accept it and are willing to do it repetitively at school and home as well.

In a word, in substituted mode, e-learning does make significant change in the traditional classroom teaching. Based on the electronic learning equipment and learning resource, the learners could study in or out of school, replacing face-to-face classroom teaching. E-learning became the main way to help the students to achieve the teaching goals of the conventional education. The quality of such e-learning courses has direct impact on the effect of their study. The relationship among e-learning, teaching objective and classroom teaching is shown in Fig. 2.

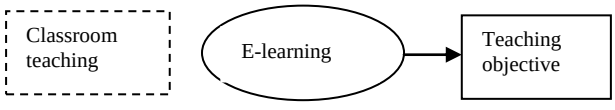

Fig. 2. Substituted mode of e-learning.

C. Blended Mode

In blended mode, e-learning, as a part of teaching, is involved in the classroom teaching. With e-learning blended, the way of conventional classroom teaching and the way of students' learning have changed a lot. Learning and teaching are not confined in classrooms. The students could discuss with the classmates and their teachers, even ask the experts on the nominated e-learning websites questions and gain suggestions from these experts. The students at different classrooms or schools could share the same teacher's teaching, have timely teacher-student interaction at the same time with support from remote technique. The learning contents are not limited to the textbook and what the teachers instruct, but expand to something deeper or at more difficult level which could meet some students' need for the further knowledge of professional fields. E-learning is combined with the face-to-face classroom teaching and achieves the goal of teaching. The combination really highlights the advantages of them. There are more active learning atmosphere, more interesting teaching activities, further communication between teachers and students, diversity of learning methods, and the depth and extent of classroom teaching expanded. However, due to the limit of the classroom teaching situation, the difference of the teachers' and students' information literacy and the lack of the high quality electronic teaching recourse, it is still hard to apply the blended mode in the primary and secondary schools widely.

Even though the blended mode requires relatively higher technology, better equipment and e-learning resource, which imply large amount of cash investment, experimental practice has been started.

Intel Corporation cooperated with the Chinese Ministry of Education in 2007, based on a research on one-to-one digital teaching, to improve an important task "a research on how to blend the diverse methods of learning and teaching into daily teaching effectively in the environment of information technology", a part of national eleventh five-year plan. Intel Corporation donated classmate PC to the primary and secondary schools in Beijing, Shanghai, Qingdao, Shenzhen and some cities in the Central West of China, aimed to support personalized teaching which suits the different levels of the students. Until now, 26 schools in more than 17 cities have been involved in the project exploring the blended mode of one-to-one e-learning with different emphasis [8]. The subjects like Chinese, Maths, English, History and Geography have been involved. Each classroom is equipped with many laptops for students, a hand mobile tablet pc for the teacher, an interactive electronic whiteboard, a projector and a dedicated machine for teaching. With these equipments, the conventional classroom could be transform into high interactive wireless computer classroom. The laptop for student has a more endearing name, "e-bag", which is so light and easy to be carried, with wireless function, long hours working battery, water-proofed keyboard，shockproof design, excellent learning software, rich learning resource and affordable price.

In a word, blended mode depends on enough hardware and software supply, the awareness and ability to use the

e-learning as a source of communication and the rich multimedia contents. E-learning is not only a tool or assisted method but a part of teaching content in classroom. E-learning and classroom teaching are blended with each other to achieve the teaching objectives directly.

The relationship between teaching objective, classroom teaching and e-learning is shown in Fig. 3.

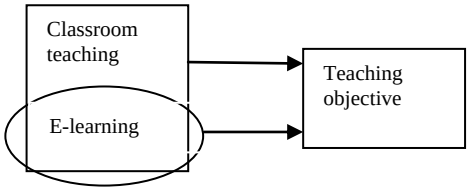

Fig. 3. Blended mode of e-learning.

VI. Problems and Solution

E-learning will be an inevitable trend and an essential part of the primary and secondary school learning and teaching in the 21st century in China, owing to its potential to offer diversity of learning contents, various ways of communication and more flexible place and time for study, and optimize the educational resources. But it is more likely for those key primary and middle schools in the capital cities and those in the east part of China to apply e-learning into their classroom teaching. For most of the primary and secondary school students, whose schools are lack of enough hardware and technological support, e-learning is still far from their real classroom teaching. Instead, e-learning is more used as an assisted way to make up for the shortage of classroom learning out of school.

Once after-school learning activities are involved, the students, their parents and the teachers play important roles in the efficient e-learning and the three parties are interconnected and interlocked. For the students, various e-leaning contents and services do motivate the students' study initiative and expand their views efficiently. However, it is worth mentioning that for most of students, they have to do extra study on the line at home after a whole day schooling at home. Some of them have been exhausted and tired of extra study even though it is on the line. Expect for their possible tiresome of learning, the biggest problem is that due to the heavy homework, the time arranged on e-learning after class is limited. As a result, it is less likely to have regular e-learning after class. Given the children's limited self-control and the differences in their independent learning abilities, the guide from teachers and parents is the critical to make e-learning efficient. On the one hand, the supports from the parents depend on whether the e-learning could improve the students' grades in the short term, because more than 1000 yuan each term for the on-line courses offered by net schools is a large financial burden for common families. On the other hand, whether the teachers give instant feedback determines the students' attentions given to e-learning after class.

The conflicts between the limited free time and a large body of learning contents, the unbalance between actual learning efficiency and the heavy tuitions for extra learning and the disharmony between the in-class feedback to the after-class e-learning and the heavy specified teaching tasks are possible to be solved by the third party—the teachers who could be trained on the line before class, combine what they learned from net-school by e-learning with what they have to teach in the class and achieve the real assisted mode of e-learning. Thus, the training of the teachers and their extra intense work on the teaching content require more financial supports. However, it is worth mentioning even though it is a way to improve the effect of teaching and e-learning, e-learning is likely to change into an indirect way of learning for the students.

VII. Conclusion

With the technological development, net resources globlization, the concept of lifelong learning interiorized, e-learning has been applying in basic education as an assistant method and changes the traditional primary and secondary school education in China. Among the three existing applied modes, assisted mode, substituted mode and blended mode, the assisted mode is most widely used in Chinese basic education. Those network schools surviving in the fierce competition support the application of the assisted mode. The factors like the extra financial burden, the efficient involvement of parents and the conflict between the limited after-class time and the large body of learning contents impact on the quality of e-learning in such mode. Enhancing the teachers' abilities of e-learning and increasing the in-class teaching quality could be a potential shortcut.

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