Methodology Article

An Empirical Study on Teachers' Informationized Teaching Ability in a Junior Middle School Based on "Internet +" - A Case Study

Li Jianping[1], Li Guosheng[2]

[1]School of Foreign Languages, Huangshan University, Huangshan City, China

[2]Qibao No. 2 Junior Middle School, Shanghai, China

Email address:

ljp@hsu.edu.cn (Li Jianping)

Abstract: This study investigates the status quo of Teachers' Informationized Teaching Ability in a junior middle school in Shanghai. It adopts the instruments of questionnaires and interviews. Based on the data collected in the research, the results are as followed: (1) Teachers in this school have a positive attitude towards application of information technology into the curriculum and keep up with the tide of educational informationization in China; (2) The concept of being student-centered is emphasized in the use of teaching and learning resources and the rate of redevelopment of online resources increases a lot and timely feedback is highlighted in the information management mode; (3) Teachers' Informationized Teaching Ability to deal with problems in teaching practice and research varies a lot. Faced with the dynamic changes in current educational situation, teaching practice in this school is rewarding. However, there exist some problems which need to be worked out. Therefore, it is suggested that the overall improvements of teachers' Informationized Teaching Ability must combine study of theory on IT-based education with regular training on teaching practice; Secondly, learning community must be established to focus on the curriculum design, the characteristics of e-learning space and the cognitive and emotional features of the students so as to guide the students' autonomous learning more scientifically; Thirdly, action research can be conducted to help teachers reflect on their own teaching experiences in the forms of teaching reflection notes and share with each other and then in turn better their own teaching continuously.

Keywords: Teachers' Informationized Teaching Ability, IT-based Teaching Reforms, Information Literacy, Autonomous Learning, Action Research

1. Introduction

The 21st century is an era of Knowledge Economy based on knowledge, intelligence and innovation. The ability will become the dominant force in this era to govern and promote the development of human well-beings. Ability refers to the essence of completing a certain activity, including the specific way of completing a certain activity and the necessities of completing a certain activity with success. Teachers' teaching ability is the basic guarantee for teachers to accomplish their work. Development and utilization of Internet and Large Database has brought unprecedented opportunities and challenges to the field of education, in which integration of educational technology into discipline instruction is deepening day by day and cultivation of teachers' informationized teaching ability, shortened as teachers' IT-based teaching ability, has been strengthened. In 2004, *Educational Technology Competency Standards for Primary and Secondary School Teachers* was issued by the Ministry of Education, which aims at promotion of teachers' ability to apply educational technology into the teaching process in an effective way and establishment of Teachers' Educational Technology Training and Examination Certification System [1]. It is the first Standard for ICT Ability in China for primary and secondary school teachers, reflecting China's

corresponding measures and explorations in face of the tide of informationization of education all over the world. In 2014, *Information Technology Application Standards for Primary and Secondary School Teachers was issued*, in which teachers' IT-based applying ability is defined as the professional competence for primary and secondary school teachers to apply the information technology to the process of teaching so that they are able to improve their work effectiveness, to promote students' learning effectiveness and their self-development [2], and in turn they can optimize teachers' professional development from the following five aspects: technical literacy, planning and preparation, organization and management, evaluation and diagnosis, and learning and development [3].

The two documents and their implementation in training for primary and secondary school teachers have enhanced the awareness of integrating information technology into subject pedagogy and brought about transformation in education mode in a large scale, which has been a push for further reforms in the field of education. The past three decades have witnessed the development of Education Informatization in China, which features as combination of fundamental construction, equipment composition and application exploration [4]. In recent years, the Internet access rate of primary and secondary schools has reached 87%, and the penetration rate of the multimedia classroom has amounted to 80%. What's more, the high-quality digital education resources are increasingly rich, the information-based teaching is increasingly popular [5]. Under the circumstances, researches on teachers' IT-based teaching ability is demanding, which focuses on the following three aspects: teachers' use of the teaching and learning resources, teachers' management of the information obtained and evaluation of teachers' information literacy. As the center of information-based teaching reform, Shanghai stands in the forefront of the reform and corresponding teacher training plans have been made to integrate information technology into English teaching. From the computer-aided language teaching to integration of IT-based language teaching, remarkable achievements have been made and the reforms are still proceeding. How to analyze and evaluate teachers' IT-based ability in the context of Internet+ turns to be a new focus. This paper aims to investigate the status quo of teachers' IT-based teaching ability in a junior middle school in Shanghai by means of both quantitative method and qualitative method from the following aspects: utilization of teaching and learning resources, management mode in Information and teachers' information literacy so as to offer factual details about teachers' performance and exploration in the process of

teaching reforms and find some existing problems.

2. Literature Review

As far as teachers' teaching ability is concerned, knowledge is put in the first position. In the 1980s, Shulman put forward the concept of PCK (pedagogical content knowledge) and held the idea that teachers must have seven types of knowledge, among which PCK is of great importance in teachers' professional knowledge and plays a dominant role in effective teaching [6]. The core of PCK is to transform subject knowledge into teaching content which is easier to be understood and accepted by students. It is a special type of knowledge that can distinguish teachers from course experts in general pedagogy.

From the perspective of teachers' quality in the future, Ye Lan believes that teachers need new abilities besides subject knowledge, including the ability to understand and communicate with others, management ability and educational research ability, and the combination of various knowledge and these abilities so that teachers can show their educational wisdom [7].

In 2005, Koehler & Mishra pointed out that a teacher must have a command of three types of core knowledge, including content knowledge, pedagogical knowledge and technological knowledge and compound knowledge formed in the interaction and integration among the above core knowledge [8]. The concept of integration in the theory of TPCK (Technological Pedagogical Content Knowledge) is of great significance for teachers to consider when, where and how to apply proper information technology in the teaching practice in a positive way in order to better students' learning style and their academic achievement. TPCK emphasizes the complexity, multidimensionality and contextuality of teachers' knowledge, trying to describe the basic quality of teachers' knowledge in order to integrate technology into their teaching. Teaching practice is of no significance with no consideration of educational situation in that teachers' skillfulness in ability-developing activities depend on the certain circumstances and the learners' knowledge acquisition and development activities can not be separated from the situation [9]. In the context of Internet+, the networking environment has offered a vivid atmosphere for both teachers and learners. Wang Weijun has made a comparison between teachers' teaching abilities in a traditional teaching environment and IT-based teaching environment through an empirical study based on five dimensions and the conclusion was drawn as follows [10] (See Table 1).

Table 1. A comparison between teachers' teaching abilities in a traditional teaching environment and IT-based teaching environment.

Dimensions	teachers' teaching abilities in a traditional teaching environment	teachers' teaching abilities in a traditional teaching environment and IT-based teaching environment
Role	Single ability	Diversifying ability
Play	Individual play	Collectivist Play
Formation	Formative ability in a school environment	Formative ability in a community and in a network
Means	Direct, closed, face-to-face communicative ability	Indirect, open, online communicative ability
Trend	Tendency to promote teachers' teaching ability	Tendency to promote students' developmental ability

It can be discovered that teachers' teaching ability in a traditional teaching environment is constrained with the teacher being at the center. Teachers are the main source of educational information in the process of teaching. Therefore, teachers' teaching ability reveals their authority to some extent while in the Information Era the sources of teaching materials have been diversified and the authority of the teacher has been deconstructed by the Internet. The education mode under the background of "Internet Plus" is characteristic of digitalization, netwoking, intelligence and multi-media. With online education, blended learning, connected learning and ubiquitous learning, teaching activities have featured as being open, sharing, interactive and collaborative. Teachers' teaching ability in the Information Society is defined as the ability for teachers to integrate the information technology into teaching activities, in which a teacher knows how to make use of the computer and the network technology to obtain the related education information so that he is able to design, apply, evaluate and manage the learning process and learning resources in the information environment [11]. Among these abilities, the abilities of teaching design, teaching implementation and teaching evaluation are the cores with the aim of promoting transformation of students' learning styles and improving their comprehensive ability to obtain the learning resources and adapt themselves to the learning environment, thus improving their information literacy.

In contrast with traditional education, IT-based education presents its own characteristics on the following aspects with education activities at the center (See Figure 1).
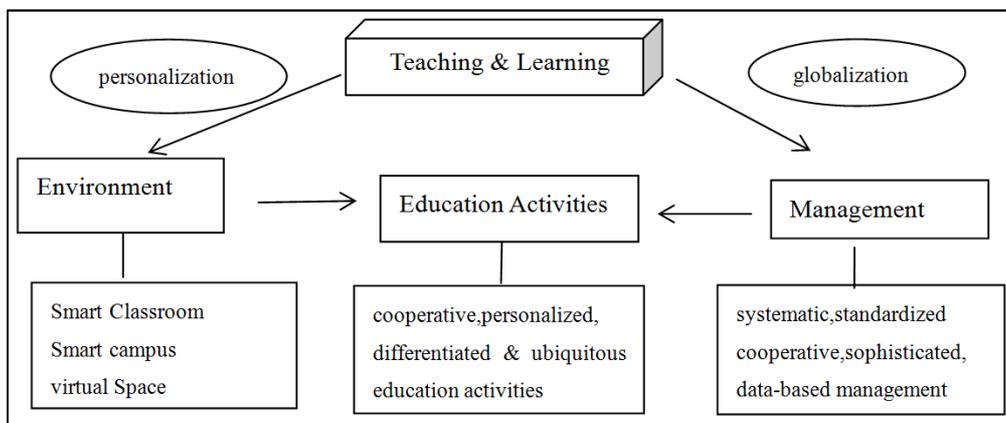

Figure 1. Interactions in IT-based education.

In the context of IT-based education reforms, the education activities, which are affected by the environment and the mode of management, are branded with the features of dynamic changes and complexities. The education reforms require English teachers to improve their IT-based teaching ability and construct their professional roles which would be in accordance with the situation in cultural globalization and tendency of individuation in teaching and learning. It can be seen from the above figure, IT-based Education reform is gradually consolidated in width and depth as well as in difficulty and complexity. The Education Informationization 2.0 Action Plan gives special emphasis on achieving the goal of improvements in informationized application and information literacy for both teachers and students [12]. The new task in IT-based English Teaching is to make full use of muti-media and network to support on-line teaching as well as off-line teaching. In addition, as guides and managers of education activities, English teachers are required to promote learners' interest in IT-based language learning and their capacity in autonomous learning. With the support of web-based learning space, all the learning contents and learning methods are carried out much closer to the real cases in the life situation, which tends to shorten the cognitive gap and experience gap, so as to fully mobilize the emotional motivation system and cognitive motivation input of the learning subject [13].

3. Research Design

3.1. Background of the Research

The study is a case study in which the English Teaching Group in a junior middle school in Shanghai is chosen as a research subject. This school is a co-unit of Key Research Base of Humanities and Social Sciences of the Ministry of Education, the Experimental Base of Basic English Quality Education in China and Research Group of Beijing Foreign Studies University. An *E-learning Space, Kouyu 100,* has been fully put into use in this school since October, 2014.

Thanks to construction of infrastructure in information technology and corresponding steps to improve teachers' IT-based teaching ability, a great change has taken place in the teaching concept, the teaching design and management in class. In order to investigate the status quo of teachers' application of information technology, a questionnaire and an interview were conducted in this school. The questionnaire was designed on the following three aspects: teachers' use of teaching and learning resources, teachers' information management mode and teachers' information literacy. And then a survey was conducted to all the teachers in the English Teaching Group on the platform named as Questionnaire Star.

Besides, six teachers were chosen for an in-depth interview in order to acquire the first-hand materials on their concepts and experiences in IT-based education reforms. Based on the above statistics, the elements which would have deep effects on the development of teachers' teaching ability in the process of informationization were focused on theoretically and practically for further analyses.

3.2. Implementation of the Research

Two steps were taken in implementation of the research.

Firstly, Thirty teachers in the English Teaching Group completed the questionnaire which is named as A *Questionnaire on Teachers' Information-based Teaching Ability in Junior Middle School* through the Questionnaire Star, an online testing platform in May, 2019. This questionnaire was confirmed on the basis of information gathered in the teaching practice of the participants in 10 junior middle schools in East China and 126 teachers were engaged in the pre-test of the questionnaire conducted in March, 2019. Based on the data analysis, the Crobach **a** of this questionnaire is equal to 0.876. The participants are required to offer such personal information as gender, age, years of working at the school, the highest academic qualification, etc. in order to make full use of the questionnaire and make an analysis on the items. The questionnaire options were graded by Likert Scale, varying from "totally agree" to "completely disagree" and SPSS. Version 25 was chosen to analyze and process the data by the research group. Secondly, six teachers from the participants were chosen for an in-depth interview respectively on June 15th, 2019. The information of the participants is as followed

(See Table 2):

Table 2. Basic Information of the Participants.

Basic Information		numbers
Gender	female	25
	male	5
Age	>51	1
	41--50	10
	30-40	6
	20-29	8
Educational background	Master's Degree	8
	Bachelor's Degree	22

The purpose for interviews is to explore their awareness, attitudes, beliefs in the context of "Internet Plus". Specifically, this study addresses the following three research questions:

(1) What problems do the teachers encounter in their teaching practice?

(2) How do the teachers obtain and make use of the online learning resources ?

(3) What measures are taken to cultivate and promote the teachers' IT--based teaching ability and what are the effects?

4. Results and Analyses

4.1. Analysis on the Questionnaire

The questionnaire is conducted to investigate how English teachers in Junior Middle School make use of the teaching and learning resources, manage and deal with the Information obtained and evaluate their information literacy. The results are as followed.

Table 3. Teachers' use of teaching and learning resources.

Items	Sub-items	Means	Standards
Construction of school hardware facilities	1. Full coverage of the wireless network has been realized on our campus. 2. Our school provides a fixed amount of storage space in the network of our campus, which is my major access to learning resources with my students.	3.759	0.808
Characteristics of the teaching and learning resources	3. The learning resources I have been using are complex in content and lack of system. 4. The audio learning resources I have been using have their own specific learning content and themes. The audio-visual learning resources I have been using are brief in content and attractive to students.	3.121	0.951
Preparation and production of the teaching and learning materials	6. I have made a micro-video to supplement the learning resources of the course. 7. The video learning resources used are mainly prerecorded (provided by Publishing House or self-recording). 8. The learning resources I have used are mainly video resources, supplemented by a small number of text resources.	2.920	0.842
Management of the the teaching and learning resources	9. Each unit of my course has a detailed list of language learning resources and instructions so that my students can learn and check it by themselves. 10. Teaching and learning resources are formed and organized by the teachers in the same grade group.	3.845	0.967

First of all, the construction of the campus network has been started since 2014 and full investment has been put into this project. Therefore, a corner-free campus network access, safeguarding the security to teachers and students for implementation of online learning in and after class. (See Table 3) Here the learning resources specifically refer to resources in foreign language teaching.

It can be found from Item 1 (Means=3.759, Std.=0.808) that teachers are free to make use of the storage space in the network of the campus, which turns to be the major access

for teachers and students to learning resources and the most economical and convenient way for teaching and learning. And teachers care more about online communication with their students through campus network, realizing mobile interaction at any time and at any place, which breaks through the time and space constraints so that the students can get timely feedback.

Secondly, teachers' use of the teaching and learning resources plays an important role in their development of information-based teaching competence. The use of online

resources is a supplement to the classroom teaching and a key element in the implementation of Smart Education. What is considered in choice of the teaching and learning resources includes the following four aspects: the cognitive characteristics of the learners, the volume of the chosen materials, the degree of relevance to the content of the textbook and evaluation of the differences of students' learning styles. From Item 2 (M=3.121, Std.=0.951), it can be speculated that the teachers give comprehensive consideration to the students' cognitive style and cognitive characteristics in the choice of text materials and audio-video materials. The subject matter of the selected material (M =3.759, Std.=1.033), the appropriate length of time and the attractiveness of the material to the student (M=3.621, Std.=0.728) are also taken into account. Therefore, the integration and unification of the content of classroom learning are guaranteed. As to preparation and production of the teaching and learning materials, most teachers choose the published audio and video materials as the major resources and then some other materials are added in order to form teaching materials suitable for students at their current level for management of the teaching and learning resources, a detailed list is given to the students before class for self-learning so that further discussion can be made in class to achieve flipped teaching. And all the teachers are organized to develop a series of teaching materials suitable for classroom teaching. Teamwork determines the quality of self-developed teaching materials to guarantee the achievement of the teaching aim.

Table 4. *Teachers' Information Management Mode.*

Items	Sub-items	Means	Standards
Management of E-learning Space	1. Data from the e-learning space help me solve the students' difficulties in English learning. 2. I use the e-learning space to carry out mutual evaluation between the students. 3. I participate in the discussion with the students in the e-learning community and make timely evaluation and feedback.	3.397	0.774
On Students' Autonomous Learning	4. I log on to the e-learning space, checking students' autonomous learning before class. 5. I push language learning resources through mobile apps. 6. I allow my students to make their own task list before class. 7. I give timely feedback and make assessments to students' autonomous learning. 8. I assign the tasks deferentially so that the students have more choices.	3.586	0.672
Interaction with students	9. I incorporate students' mutual feedback and interactions between the teacher and the students into my teaching. 10. I use information technology to produce language learning resources with the help help and guidance of my students.	3.414	0.752

In the blended learning model, interaction with students online, which occurs at any time and at any place with the support of the e-learning space, is an effective access to teachers' management in the network learning process and the corresponding learning resources. Teachers' prompt response to questions can enable the students to solve the problems in time so that they can carry out further exploratory study and develop their autonomous learning ability. In addition, interaction between the teachers and the students can further enhance students' confidence in their self-learning and promote mutual trust between them. It proves to be an effective way for teachers to make up for their lack of attention to the students' difference in personality and their individual needs in language learning. What is more significant is that teachers' timely responses help to achieve the concern and development of knowledge, emotion, consciousness and attitude in education. Data in Table 4 show that teachers have a high degree of approval for Information Management. Among the 10 sub-items, Sub-item 2 (M=3.689, Std.= 0.661), Sub-item 3 (M=3.655, Std.= 0.614) and Sub-item 9 (M=3.655, Std.=0.614) are the most representative, which reflects that teachers have a high degree of consciousness and initiative in the management of Smart Education Platform and can make full use of the E-learning Space.

Table 5. *Teachers' Information Literacy.*

Items	Sub-items	Means	Standards
Information applying capacity	1. Editing videos and other language learning resources is beyond my power.	2.931	1.033
	2. I use my smart phone and relative apps to manage my teaching.	3.621	0.863
	3. I make use of the e-learning space to carry out the students' self-evaluation.	3.310	0.806
	4. I can skillfully use social software to communicate with my students.	4.000	0.707
Awareness and Emotion	5. I don't take students' suggestions or ideas in mutual communication in a learning community in and out of class.	2.621	1.049
	6. I regulate the content and progress of the class according to students' learning state of the extra-curricular e-learning platform.	3.310	1.004
	7. I feel it unnecessary to put information technology in my classes to create a teaching environment, so I have never tried it.	2.172	0.929
	8. I encourage students to constantly self-evaluate the process and effectiveness of autonomous learning.	3.483	0.785
Retrieving and evaluating information	9. Students' accomplishment and quality of the tasks on the e-learning space is an essential part of the assessment of my course.	3.414	0.867
	10. Data from the e-learning space can help me find the weaknesses in the students' foreign language learning.	3.655	0.769

As Chen Jianlin points out, information literacy is the comprehensive ability of a person to realize when information is needed and how to retrieve, evaluate and use information effectively, and then to process, organize, refine and innovate the information in order to obtain knowledge and solve certain problems [14].

The first four items belong to information applying ability. Smart phones and relative Apps. are used as tools for guidance to students' learning (M=3.621, Std.= 0.863) and social soft wares (Qq or We-chat) are commonly used by the teachers for communication with their students (M= 4.000, Std.= 0.707). As for classroom teaching, the teaching contents are not constrained within a textbook. It makes a sense for teachers to edit audio-videos and other language learning resources for a complement in order to be clearly understood by the students. The ability to choose the learning materials and edit these materials turns to be a necessity and the teachers take great efforts to master the skill although it is time-consuming. In addition, the e-learning space is of great help to teaching and learning. Take Kouyu 100 for instance. It has been established since 2014 and it is used for students' daily practice in listening and speaking and it's also a platform for teachers to manage students' learning tasks, assign homework, and give timely feedback. For students, they can have a self-evaluation guided by the teachers (M=3.310, Std.= 0.806), which is a process of mutual communication and interactions.

The four items (Items 5, 6, 7, 8) are related to information awareness and emotion of teachers when dealing with the relationship between teaching and learning. For most subjects who have conducted this questionnaire, they choose to regulate the content and progress of the class on the basis of students' learning state (M=3.310, Std.=1.004), which shows that the teachers are clearly conscious of their dominant and guiding roles in the process of teaching. Thus they are always encouraging the students to learn on their own and then self-evaluate the process and effectiveness of their autonomous learning (M=3.483, Std.=0.785), which conforms to the basic concept in Kim & Oh's Smart Education, which refers to the combination of five aspects: being self-oriented, motivated learning through interest, support for layered adaptive teaching and having plenty of free teaching resources and technical embedding [15]. *The Education Informationization 2.0 Action Plan* demands for improvements of infomationized application and information literacy for both teachers and students (the Ministry of Education, 2018) and cultivation of which must be integrated into daily teaching practice. Item 5 (M=2.621, Std.=0.929) and Item 7 (M=2.172, Std.=0.929) show that the minority of the subjects holds the idea that it is none of their business in the transformation of the teachers' role and they are still self-centered in their experiential teaching practice.

The last two items reveal the student-centered concept in retrieving, evaluating and making use of information in an effective way. A teacher's information literacy lies not only in his utilizing the information but also in the way he offers assistance to his students for their accomplishment of the tasks on the e-learning space with the course assessment (M=3.414, Std.=0.867) and self-guide their own teaching contents and teaching methods (M=3.655, Std.=0.769) and in turn the students have gained great benefits from teachers' timely feedback, which is a win-win situation in a virtual learning space.

4.2. Analysis on the Interviews

The face-to-face interviews were conducted to the six teachers at different age groups from the English Teaching Section. All the interviewees were anonymous. The questions were asked to guide them to recall and recount their teaching experiences in the development of educational informationization and their expectations for self-development in their own teaching career. The personal information of the six participants is as follows. (See Table 6)

Table 6. Personal Information of the Six Participants.

Names	Years of working	Gender	Professional Title	Education qualifications
Mark	30	Male	Associate professor	B. A. in English education
Amy	20	Female	Associate professor	B. A. in English education
Kathie	14	Female	Lecturer (3Level)	B. A. in English education
Celina	12	Female	Lecturer (2 Level)	B. A. in English education
Railey	6	Female	Lecturer (1 Level)	M. A. in Linguistics
Andrew	3	Male	Teaching Assistant	M. A. in Linguistics

Each interview lasted for about half an hour. All the interviews were audio-taped, transcribed, translated into English, and then presented to the participants for verification. Data analysis was an on-going iterative process involving both deductive and inductive reasoning. The initial categories were deductively obtained from the above-reviewed literature on teachers' information-based teaching competence in the context of "Internet Plus". The conceptual framework has helped grouping the data. The coding started inductively as we tried to understand what the interviewees were telling us. After careful reading of all the interviews, we came up with some initial codes, linkages and meaning about the participants' attitudes, beliefs, problems they have encountered in their teaching experiences and some effective steps in cultivation and promotion of language teachers' IT-based teaching competence

Among the six participants in this study, Mark and Amy have experienced the three stages of the development of IT-based education reforms in English instruction and they've gradually learned how to make use of modern facilities to offer help to students and how to discover online resources as a supplement for their teaching. They actively participated in

all kinds of training in order to update their knowledge about the function of modern technology. For the first and the second questions, they give their views respectively. Mark is in charge of the English Teaching Group in this school and he has to implement policies of teaching reforms and guide the teachers to participate in a series of teaching practice.

Amy speaks frankly of her change of attitudes towards IT-based Language Teaching. She said that she had never learned anything related to IT-based teaching methods at university and she had been attracted by her English teacher for her graceful handwriting and melodious voice. She once believed that she could teach English well without using computer-assisted language teaching method. Therefore, she was so confused about investment of a large amount of money in construction of multiple-media classrooms that she thought it was just a waste of money.

Different from Mark and Amy, Kathie and Celina were faced with two rounds of putting the educational technology into teaching practice. Both of them were required to accept the teaching mode with multiple-media devices at the very beginning in their teaching career. That is to say, they belong to a generation who grow up with educational technology. In her teaching career, Kathie keeps up with the flow and performs well.

Opposite to Kathie, Celina speaks frankly of her incapability and deficiency in the operation of new teaching methods in her teaching process. However, she has a clear awareness that it is time for her to follow her colleagues and ask them for help.

Compared to the above four teachers, Railey and Andrew are positive in application of Information technology in English instruction. Actually, they are representatives among novice teachers. Both of them emphasize the process of the course design with the IT teaching concepts and teaching methods integrated into it.

Thanks to her sensible perception of education, Railey has adjusted herself to the new round of reforms and made great progress. She thinks more about the overall design in the process of IT-based EFL teaching and makes some explorations on this issue through some co-operative teaching projects, such as preparing for class with the members in the teaching and research section, giving public lessons and joining in communities of teaching practice, etc.

As is stated by Andrew, he has a passion for new technology and he is actively engaged in all activities related to the reform of IT-based language teaching and learning. He has turned to be a helpful and reliable assistant and an expert to cope with some problems related to installment of hard wares and application of some soft wares.

With the deepening reforms in IT-based English instruction, teachers are faced with a series of challenges and encounter some problems in their teaching practice. Therefore, it makes sense for teachers to adapt themselves to the new situation.

In spite of confusion and doubt about the IT-based teaching instruction, Amy has been working hard to follow the tide. As a leader of a course group, she takes great pleasure in guiding the members of the group to prepare for the lesson and apply for projects. Thanks to her great efforts in teaching practice,

her colleagues have gradually been accustomed to a series of training related to IT-based English teaching and learning without any complaint and they tend to be more active in attending academic conferences, participating in public classes and applying for some projects for further research. She is actually an active practitioner and a guide in the implementation of the policy to the novice teachers.

As far as teaching and learning resources are concerned, great changes have taken place. With the application of e-learning space, teachers have possessed more teaching resources to enrich their English class and more tools to evaluate students' homework.

As to cultivation and promotion of language teachers' IT-based teaching ability, some fixed steps prove to be widely accepted, such as regular public classes, micro-class competitions held every semester and the yearly training from the educational department of the district in which the school is located. Besides, application for projects is put in the first position. As a leader in the teaching and research group, Mark is clearly conscious of his responsibilities in leading the team to arrive at the requirements when he has taken charge of a sub-project named as *An Empirical Study of IT-based English Teaching Based on Kouyu 100 Smart E-learning Space* from 2014 to 2016. During this period of time, he has attended academic meetings and cooperated with experts from the Office of Project Guidance, the Central audio-visual Education Center. Meanwhile, an experiment has been conducted in this school, which required all the students from Grade 6 to Grade 9 to sign up and log in the Kouyu 100 e-learning space. With the help of AI teacher Aryn, teachers can assign homework in listening and speaking and students are required to practice listening and speaking in this e-learning space. To their delight, they can have timely feedback from the system. Thanks to this project, a team has been established, in which team members prepare for classes in a cooperative way and public teaching is conducted for teachers' growth and progress.

Mentor-apprentice pairing mode is helpful to novice teachers. All the interviewees stand up for this system and speak highly of this mode and show their gratefulness to the mentors. Railey said she had followed her mentor in lesson preparation, project application and participation in public teaching activities, which helped her grow up and embrace the new technology.

From the above analyses, a conclusion is made as follows: the six interviewees are active practitioners in the application of information technology into language teaching and they can keep up with rapid pace of IT-based education reforms in English instruction in junior middle school. Through their hard work, they've achieved their goals as qualified teachers and gained a sense of achievement. As self-conscious learners, they have persisted in caring about the changes of education polices and application of new technology in their own teaching practice.

5. Conclusion

Based on previous research and analysis of the application

stage of information technology in curriculum teaching [16, 17], the development of teachers' IT-based teaching competence can be described as four stages: application stage, learning and imitation stage, transfer and integration stage and wisdom creation stage [18]. In several rounds of English teaching reforms, the education departments at all levels have constantly given emphases on strengthening the combination of technology and curriculum, covering the above four stages. It is true that integration of information technology into curriculum is of great help to optimize educational resources, increase the variety of teaching methods, improve teaching efficiency and the quality of personnel training, thus fostering teachers' professional development.

However, there still exit some problems. Although teachers in junior middle school have a lot chances to attend vocational training and teaching competition so that they can acquire basic skills in using technology, there is a lack of systematic guidance from the educational departments and the teachers seem to be incapable of applying for projects and doing researches. In most cases, teachers are basically in a state of self-learning and self-regulation. The reform itself is a certain challenge to teachers' teaching behavior, and the information technology has always been a double-edged sword on the head of teachers, who are short of courage and ideological support in their efforts to adapt themselves to the transformation of teaching concepts and teaching modes.

Therefore, the school itself must take some measures to integrate and utilize various network channels and resources to effectively organize some research activities and set up some goals to solve the existing problems existing in the current teaching practice. The school principals are the leaders who take responsibility for the implementation of the upgrading project. Hence training for improvement of their organizational and managerial capabilities in IT-based teaching reforms must be put on the agenda. In addition, it is necessary to perfect the system and the mechanism to lay a solid foundation for teachers to foster their IT-based teaching ability and to apply information technology into their teaching practice [19]. Through the effective integration of school-based study and network study, teachers can develop innovative teaching in information environment and form their own research subjects [20]. In addition, teachers can conduct action researches and reflect on their own teaching experiences in the forms of teaching reflection notes, sharing with each other and in turn guide their own teaching.

Modern teachers feature as life-long learners, who must embrace new technologies with the students to improve their IT literacy; allow students to actively question and learn in inquiry in real and virtual experiences; teach students to think and explore the unknown to foster critical thinking and encourage students to create and share with others. The improvements of teachers' IT-based teaching competence are bound to combine school education, regular training in a certain learning community with inner insight, so it is suggested that both regular training and inner reflection must be kept abreast of each other for the stable professional development for the career.

References

[1]   Ministry of education. Circular on the publication of the Technical Standards for the Education of Primary and Secondary School Teachers (Trial). Teacher [2004] No. 9.

[2]   Ministry of education. National Standards for the Application of Information Technology in Primary and Secondary Schools [S]. 2014-05-27.

[3]   Zhu Zhiting, Yan Hanbing. Interpretation of the Standards for the Application of Information Technology in Primary and Secondary Schools (Trial) [J]. Audio-visual Education Research, 2015 (9): 7-8.

[4]   Ren Youqun. Stepping into the New Age of Chinese Education Informatization: Interpretation of Education Information 2.0 Action Plan (1) [J]. Research on Audio-visual Education, 2018 (6): 27.

[5]   Ministry of Education. Notice of the 13th Five-Year Plan of [EB/OL]. http://www.moe.edu.cn/srcsite/A16/s3342/201606/t20160622 _269367.html, 2017-03-22.

[6]   Shulman L. S. Knowledge and teaching: foundations of the new reform [J]. Harvard educational Review, 1987, (57): 1-22.

[7]   Ye Lan. A Preliminary Study on Teachers' Professional Quality in the New Century [J]. Educational Research and Experiments, 1998, (1): 45.

[8]   KOEHLER M J, MISHRA P. What happens when teachers design educational technology? The development of technological pedagogical content knowledge [J]. Journal of educational computing research, 2005, 32 (2): 131-152.

[9]   Zhang Jinbao, Yang Xueping, Pei Chunli. Reflections on the Evaluation of Educational Technical Ability of Primary and Middle School Teachers [J]. China Audio-visual Education, 2007, (4): 1-2.

[10] Wang Wenjun, Wang Wei-jun. Practice Analysis of Teachers' Informationized Teaching Ability [J]. Modern distance education, 2012 (3): 68.

[11] Zhong Zhixian, Wang Youmeng, Huang Yan, Shi Hongbing. Investigation and Research on Information Literacy of Primary and Secondary School Teachers [J]. Audio-visual Education Educational Research, 2003 (1): 65-69.

[12] Ministry of education. Information on the publication of the Educational Information 2.0 Action Plan [EB/OL]. (2018 -04-13)   [2018-08-11]. http://www.moe.gov.cn/srcsite/A16/s3342/201804/t20180425 _334188.html.

[13] Zhu Zhiting, He Bin. Research on the new Realm of intelligent Education informationalization, Audio-visual Education, 2012 (5): 13.

[14] Chen Jianlin. Integration of Computer Networks and Foreign Language Courses [M]. Shanghai: Shanghai Foreign Language Education Press, 2010: 159.

[15] Kim´B. H. & S. Y. Oh. A study on the SMART education system based on cloud and N-screen [J]. Journal of the Korea Academia-Industrial Cooperation Society, 2014 (01).

[16] Patricia L. Rogers. Barriers to Adopting Emerging Technologies in Education [J]. Educational Computing Research, 2000, 22 (4): 455-472.

[17] Yu Shengquan. The scientific development of the ecological view of educational informatization and the application of new technology in education. Basic Education. 2006, 9: 5-8.

[18] Wang Wei-jun. Informationization Teaching Ability: The Challenge of Teachers in the Information Society [J]. Modern distance education. 2012 (2): 49.

[19] Opinion of the Ministry of Education on the Implementation of the National Project for Improving the Ability of Primary and Secondary School Teachers to Apply Information Technology [EB/OL].
http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s70 34/201311/159042.html, 2016-22.

[20] Zhang Yi, Chen Beilei, Fan Fulan, et al. Research on Development Planning of Teacher's Information Technology Application Ability Improvement Based on Empirical Evaluation —A Case Study of Huizhou City, Guangdong Province [J]. China Audio-visual Education, 2017, (4): 31-40).

Biography

Li Jianping is associate professor in Foreign Languages School, Huangshan University, Anhui Province. Her main research interests are in computer-assisted language teaching and learning, teacher professional development.

Li Guosheng is a senior teacher and head of teaching and research section in Qi Bao No. 2 Junior Middle School, Shanghai. He is also the academic leader in English teaching and learning in Minhang District, Shanghai.