

Chinese College English Teachers' Ability to Develop Students' Informationized Learning in the Era of Big Data: Status and Suggestions

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ABSTRACT

College English teachers should vigorously promote the integration of the latest information technology and curriculum teaching. The application of modern information technology to college English teaching has not only modernized, diversified and facilitated the teaching methods, but also changed the teaching concepts, teaching contents and teaching methods. The ultimate goal of integration is to promote the development of students' informationized learning ability. Therefore, the purpose of this paper is to investigate college English teachers' development of students' informationized learning ability in the era of big data, and explore a motivation system that motivates teachers to develop students' informationized learning ability. A questionnaire survey was conducted in three universities with different degrees of informationization. It is found that the universities do not make enough investments to accommodate the future development needs of smart education; the teachers show weak ability to use the software, do not master the use of software and fail to implement the design, development and the nation has not issued institutional policies and offered enough time and opportunities for teachers' training. It is advised that the development of teachers' informationized teaching ability is to strike a balance between promoting the development of teachers' teaching ability and enhancing the development of students' learning ability; China should make dynamic adjustments to the assessment and monitoring system of teachers' informationized teaching ability and China should keep pace with the times in terms of investment in education teaching cause, and gradually improve its policy supports and incentives.

Keywords: college English teachers, ability to use information tools, motivation system

INTRODUCTION

Undoubtedly, the wide application of modern information technology (especially the Internet and multimedia technology) injects infinite fresh power into college English teaching. The new teaching platform definitely provides college students with the convenience to develop their comprehensive English abilities. In the traditional teaching concept, the teachers assume the responsibility of "propagating the doctrine, imparting professional knowledge and resolving doubts", so they are absolute authority of knowledge (Mei, 2011, pp. 165-170). However, in the new teaching model, the teachers are responsible for designing and developing the learning process and resources, guiding and promoting the students' learning process, organizing and coordinating the students' collaborative learning, monitoring and assessing the students' learning process, so they are no longer the "center" of the class. With the continuous development of informationized learning, the education service includes not only schools, but also social institutions and various networks that can provide education services. As a result, both on-campus and off-campus learning services are available, realizing an integrated on-campus and off-campus as well as the online and offline education service experience. What's more, the convenient information services

Contribution of this paper to the literature

- This paper contributes to increasing teachers' motivation to study teaching English with IT and know the present situation of teachers' ability to develop students' informationized learning in the Era of Big Data.
- The paper provides instructions and suggestions to enhance College English Teachers' ability to develop students' informationized learning in the Era of Big Data.
- By considering the researches made by scholars as mentioned in the literature review, this study develops a more comprehensive framework to analyze and evaluate teachers' ability to develop students' informationized learning in the Era of Big Data.

have prompted the reconstruction of foreign language teaching and learning model. The independent learning, U-Learning, social learning, game-based learning, inquiry-based learning under the simulation environment, remote real-time collaborative learning and social interactive learning will become the main forms of student learning in the future information society (Fang & Chen, 2018, pp. 57-62).

As the information society puts forward new requirements on the teaching ability of teachers, the students' learning abilities also change accordingly. The relevant previous studies (Ran, 2014; Ran & Yang, 2014; Shen & Li, 2017; Wang, 2009) focus on the improvement of teachers' effective teaching ability as well as the promotion of teachers' professional development in the information environment. At present, much attention is paid to the development of students' abilities. This phenomenon thus indicates that the improvement of teachers' teaching ability is to promote the development of students' learning ability. This trend of change is proved by other countries' requirements on the teachers' technical competence standards. Furthermore, it is believed that the development of teachers' informationized teaching ability aims at promoting the development of informationized learning ability of students who adopt different learning styles and strategies. In other words, although this study focuses on the development of teachers' informationized teaching ability, the purpose of this ability is to promote the development of students' informationized learning ability. A questionnaire survey was conducted in three universities with different degrees of informationization to investigate college English teachers' development of students' informationized learning ability in the era of big data, and explore a motivation system that motivates teachers to develop students' informationized learning ability.

LITERATURE REVIEW

Wang (2012, pp. 45-53) argued that "informationized teaching ability was divided into six sub-abilities: the informationized teaching transfer ability, informationized teaching integration ability, the informationized teaching communication ability, the informationized teaching assessment ability, the informationized collaborative teaching ability and the ability to promote students' informationized learning". Zhao and Guo (2010, pp. 28-31) emphasized that "the informationized teaching ability referred to the ability that the teachers took advantage of the information and communication technologies, promoted the students to transform the learning methods, and enhanced students' comprehensive utilization competence over learning resources and the learning environment in the information literacy process by adopting the teaching design, teaching implementation, teaching assessment and other methods." According to Wang, "the informationized teaching aimed at making full use of information resources to promote the students' development and to efficiently complete the teaching tasks." He classified the teachers' informationized teaching ability into six aspects - the informationized teaching transfer ability, informationized teaching integration ability, the informationized teaching communication ability, the informationized teaching assessment ability, the informationized collaborative teaching ability, and the ability to promote students' informationized learning (Wang, 2009, pp. 106-111).

The TSACK (Technological Strategic and Content Knowledge) framework explains the requirements over the abilities and knowledge of teachers who are in an implicit position. The TSACK framework focuses on teachers but ignores students. Ruan (2014, pp. 20-26) held that they must grasp the subject knowledge, learning methods or tactical knowledge as well as the information technology knowledge in learning. TSACK refers to Technological Knowledge, Content Knowledge and Strategic Knowledge (See [Figure 1](#)). The vigorous development of "research-based learning", "inquiry-based learning", "task-based learning", "project-based learning", "action learning", "independent learning" and the "flipped classroom" are to improve the students' knowledge and ability. In addition, the TSACK framework can be used to explain the ability and knowledge of students who are in an explicit position, and it is the expansion and complement of the TSACK framework.

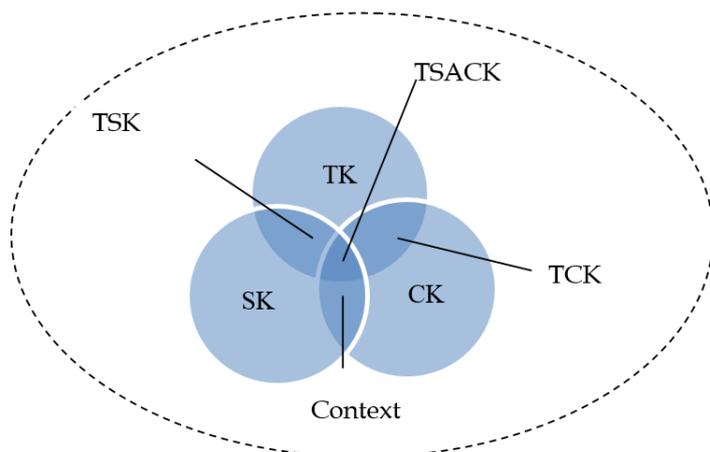


Figure 1. TSACK Framework Diagram

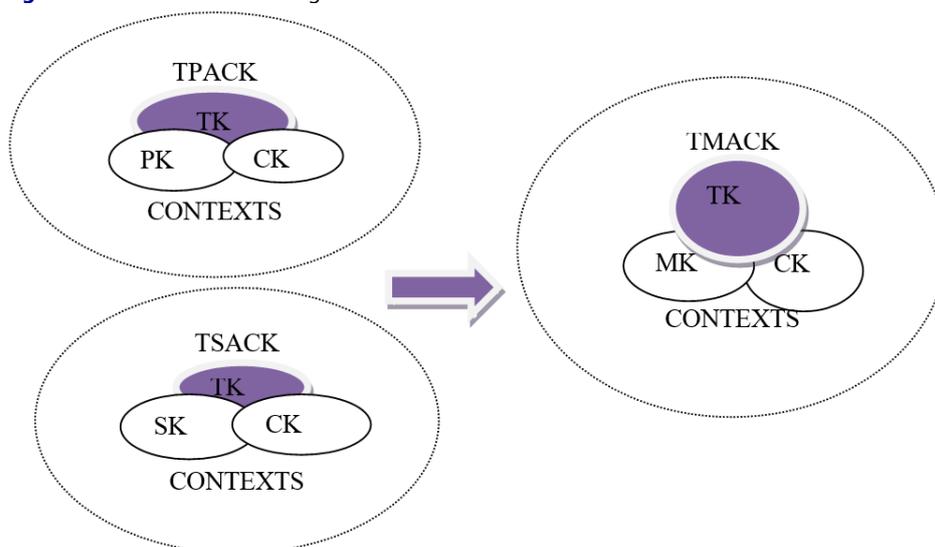


Figure 2. TMACK (Technological Methodological and Content Knowledge) Framework Diagram

Fundamentally, both the ability of teaching methods (teachers) and strategy for learning methods (students) fall into the category of methodology. They are an advanced thinking of asking, analyzing and solving questions, that is, methodological knowledge. To sum up, the ultimate goal of educational activities is to achieve common development of teachers and students. The knowledge and ability structure required in this process is TMACK (Technological, Methodological and Content Knowledge), which can be expressed as: $TMACK = TPACK + TSACK$ (as shown in Figure 2).

Shen and Li (2017, pp. 55) argued that the prerequisite ability for teachers to achieve the informationized teaching was the ability to realize the high integration between informationized technology and the college English teaching, including the informationized teaching design ability, the English content knowledge ability, the ability to use information tools for implementation of teaching, the informationized communication ability, the informationized assessment ability and the informationized teaching, research and reflection ability. The ability to use information technology tools was the foundation and premise of integration. The teaching research and reflection of teachers may develop and enhance the teachers' integration ability. The ultimate goal of integration was to promote the development of students' informationized learning ability. Besides, the college English teachers should facilitate their students to develop the following abilities: (1) online independent learning ability; (2) self-control ability; (3) information acquisition ability; (4) information evaluation ability; (5) information management ability; (6) information processing ability; and (7) communication and collaboration ability (as shown in Figure 3).

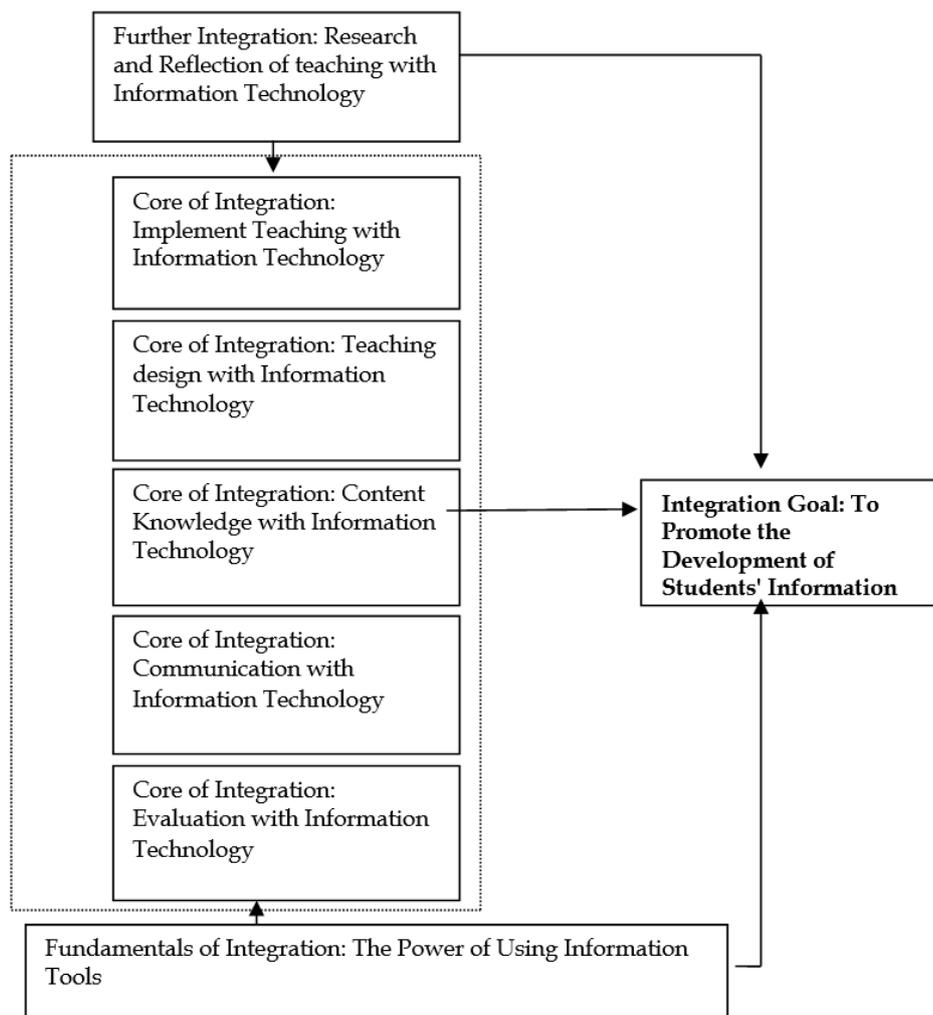


Figure 3. Schematic Diagram for College English Teachers' Informationized Teaching Ability

RESEARCH DESIGN

To learn more about the current situation of college English teachers' informationized teaching ability, the author designed *the Questionnaires on College English Teachers' Ability to Use Information Tools*. The Likert scale was used in all questionnaires and consisted of: 1 = "Strongly disagree", 2 = "Disagree", 3 = "Neither agree nor disagree", 4 = "Agree", 5 = "Strongly agree".

In the first half of March 2015, the author made an online survey, when a total of 135 questionnaires were returned. Of these, 131 valid questionnaires were recollected. The success rate was 97%. Using SPSS software, the recovered data were processed, the reliability of the questionnaire was examined, and the questionnaire items were analyzed.

In order to examine whether the specific content of the questionnaire survey has discriminatory ability, that is, whether the questionnaire project has discriminating power, the author used the independent sample T-test and related analysis methods to analyze the questionnaire. If the correlation coefficient is equal to or greater than 0.30, and the significance level is reached ($p \leq 0.05$), it indicates that the internal consistency of the questionnaire is high or the questionnaire item has a good differentiation (Qin, 2009, pp. 209). After summing up and analyzing the scores of all the items (34 items) of the 131 student questionnaires, it was found that only one item's correlation coefficient was less than 0.30, and the requirement for the significance level ($p \leq 0.05$) was not reached. As far as possible to ensure that the questionnaire has a good degree of differentiation, the author deleted this item.

Reliability refers to the stability of the questionnaire measurement results. Reliability can be analyzed by the external reliability test and the intrinsic reliability test. Since the study was conducted via online testing, the questionnaire could not be re-tested. Therefore, instead of using the external reliability test, the author used the

Cronbach's alpha coefficient to examine the reliability of the questionnaire in the intrinsic reliability test method. According to Qin (2009, pp. 220-221), the generally accepted Cronbach's alpha reliability coefficient should not be lower than 0.70; and using the SPSS 19.0 statistics package, the Cronbach's alpha coefficient of this questionnaire was 0.931, indicating that the internal consistency of the questionnaire was high.

After adjustment, the questionnaire consists of 33 items.

In May 2015, the author conducted a questionnaire survey on three universities: A, B and C. A total of 450 students and 160 college English teachers participated in the survey. The author entrusted some teachers from the three universities to hand out the questionnaires. He required the teachers to inform students of the purpose, significance and matters needing attention of this survey in advance, and required the teachers to collect the questionnaires after being filled out. A total of 450 questionnaires were handed out to students, with 420 questionnaires recovered. Through careful observation and analysis, 33 invalid questionnaires (the same answers were given for all questions or the questionnaires were only filled out partially) were removed, and 387 effective questionnaires were collected as the data source for the survey. Afterwards, all questionnaires were entered into the SPSS 19.0 software for future use after careful sorting.

DATA ANALYSIS AND DISCUSSION

Analysis of Questionnaire Data

The foreign language learners dock with "Internet +" in the big data era. In the face of massive learning resources, the learning methods have undergone tremendous changes, from the traditional models to e-learning, mobile learning, U-learning, smart learning and deep learning. These new learning methods provide a solid platform and basis for human information exchange and innovation development. However, these big data-based learning methods have not been adequately reflected in China's foreign language teaching. The traditional class teaching is still the popular. For example, the students accept teaching with the same mode, contents and progress, and they are subject to limited choice and utilization of technologies and resources. Therefore, it is essential to reconstruct a new appropriate and effective paradigm of foreign language teaching by relying on "Internet +", so as to make China's foreign language teaching keep pace with the big data era (Chen, 2017, pp. 5). As the informationized learning methods continue to expand, the education service providers include not only schools, but also social institutions and various networks. As a result, both on-campus and off-campus learning services are available, realizing an integrated on-campus and off-campus as well as the online and offline education service experience.

Table 1. Questionnaires on College English Teachers' Ability to Use Information Tools in Three Universities

Questions	Three Universities	
	Mean	Standard Deviation
1. Our hardware facilities can meet our informationized learning requirements.	4.05	.718
2. I like the English programs regularly broadcasted on the campus radio.	4.63	.651
3. I like to use the campus Wi-Fi to assist in English learning.	4.53	.672
4. My English teacher has good computer skills.	3.36	.751
5. I like our teachers to carry out college English teaching by using computer, internet and other informationized tools.	4.36	.542

According to **Table 1**, Q1 - "Our hardware facilities can meet our informationized learning requirements" (M=4.05) indicates that, students from the three universities are basically satisfied with the hardware conditions. As the computer, multimedia and other information technologies enter the campuses, the universities have invested heavily in the configuration of English teaching facilities, so the hardware facilities continue to be improved. The universities regularly broadcast English programs (Q2, M=4.63), and the students use the campus Wi-Fi to assist in English learning (Q3, M=4.53). The teachers often use computers, networks and other informationized tools for college English teaching (Q5, M=4.36), but the students think that the English teachers' computer skills need to be improved (Q4, M=3.36). Consequently, the universities shall continue to increase investment, so as to accommodate the future development needs of smart education: online decision-making, learning analysis and data mining.

The ability to use information tools refers to the ability of using teaching equipment, teaching software, network and other information tools in college English teaching (Vance & Carlson, 2013, pp. 35-43). For teachers who undertake teaching tasks, certain technical skills and ability is one of the teaching abilities that the teachers must possess. This requires teachers to complete classroom tasks by making use of simple teaching software in multimedia devices. According to **Table 2**, Q6 - "When teaching college English, my teacher can freely operate the multimedia teaching platform devices such as the computer, projector and video presenter, and other teaching

Table 2. Questionnaires on College English Teachers' Ability to Use Information Tools in Three Universities

Questions	Three Universities	
	Mean	Standard Deviation
6. When teaching college English, my teacher can freely operate the multimedia teaching platform devices such as the computer, projector and video presenter, and other teaching equipment such as the camera.	4.02	.818
7. When teaching college English, my teacher can skillfully use office software (such as word, Excel, etc.).	4.03	.791
8. When teaching college English, my teacher can skillfully use texts, pictures, animation, video and other media to carry out teaching.	3.53	.773
9. When teaching college English, my teacher can use the network platforms (such as QQ and MicroBlog) to publish discussion questions to discuss with us.	4.06	.781

Table 3. Questions on Analysis of College English Teachers' Informationized Content Knowledge Ability

Questions	Three Universities	
	Mean	Standard Deviation
10. I once saw in the courseware the data and resources about English learning collected by my English teacher with a camera.	3.53	.980
11. My English teacher can vividly present college English learning contents by using images, video, animation and other information technologies.	3.62	.935
12. My English teacher can use the image processing software and video editing software to process the collected data and resources according to the needs of teaching, so that we can use them in class.	3.78	.792
13. My English teacher can present simple and clear PPT with rich contents and scientific reasonable forms of expression.	3.73	.870
14. My English teacher allows us to copy his/her digital college English teaching resources.	3.90	.812

equipment such as the camera" (M=4.02) indicates that, through the training conducted by factories and the universities, the college English teachers can freely operate the multimedia teaching platform devices such as the computer, projector and video presenter, and other teaching equipment such as the camera. Q9 - "When teaching college English, my teacher can use the network platforms (such as QQ and MicroBlog) to publish discussion questions to discuss with us" (Q9, M=4.06) implies that, the teachers can timely interact with students by using the network platforms (such as QQ and MicroBlog). The teaching in the information society is not only the imparting of knowledge and skills, but also the development of students' learning ability and the growth of students. Therefore, it is necessary for teachers and students to interact effectively. The teaching methods in the information society embody the characteristics of selection and interaction. Correspondingly, the students' learning methods are also inclined to cooperation, dialogues, exchanges, inquiries and similar practices. With the popularization of MicroBlog, more and more teachers begin to introduce MicroBlog to the field of teaching practice, making it a tool for students' learning and network interaction between students and teachers. The application of MicroBlog to college English teaching may facilitate students to carry out independent learning. However, the teachers show weak ability to use the software, do not master the use of software (such as office software, image processing software, animation software, and video-audio editing software), and fail to implement the design, development, processing and rendering of college English teaching resources with these software (Chen, 2017, pp. 3-16).

According to Table 3, Q10 - "I saw in the courseware the data and resources about English learning collected by my English teacher with a camera" (M=3.53) shows that, most teachers can use the information technologies of images, videos and animations to express English knowledge, transmit information and promote learners' understanding and meaning construction according to the modern teaching concept and teaching needs. Q11 - "My English teacher can vividly present college English learning contents by using images, video, animation and other information technologies" (M=3.62, M=3.73) suggests that, most teachers can use the information technology tools such as cameras to record the data and resources required for English teaching, and process the data and resources by using the image processing software and video editing software according to the needs of teaching, yet the teachers show weaknesses. Q12 - "My English teacher can use the image processing software and video editing software to process the collected data and resources according to the needs of teaching, so that we can use them in class" (M=3.78) indicates that, most teachers can use the computer, network hard drive, web favorites and other information technology tools to classify and save digital college English teaching resources. Q14 - "My English teacher allows us to copy his/her digital college English teaching resources" (M=3.90) shows that, most teachers can use the information technology tools (such as online survey platform) to evaluate the relevant digital college English teaching resources, but they fail to give full evaluation.

With the continuous development of the information era, the classroom teaching also proposes new requirements for teachers' roles. On the one hand, the teachers should master various common information tools for assistance in teaching. On the other hand, the teachers are required to transmit these tools with students, mobilize their enthusiasm to participate in classroom activities, and play the main role of students. The ability to manage teaching links by using information tools refers to the ability to manage all links of college English teaching implementation by using information tools so as to achieve the teaching objectives. Examples include the ability to stimulate and maintain students' learning motivation, as well as the ability to respond to emergencies. As can be seen from **Table 4**, Q16 - "My English teacher stimulates our motivation to learn in the informationized teaching" (M=3.90) and Q17 - "My English teacher can use the network communication technologies (E-mail, QQ, MNS, etc.) and guides us to learn collaboratively" (M=3.59) show that, the teachers have developed the ability to stimulate and maintain students' learning motivation. Q18 - "My English teacher can monitor our online learning activities and learning process and guide us to resolve problems by using the information technology tools" (M=3.60) indicates that, most teachers have the ability to monitor the students' online learning activities and learning processes and give timely instruction to students' problem-resolving ability by using the information technology tools, yet there is room for improvement. Q20 - "My English teacher sends us the learning materials collected online before class" (M=3.33), Q21 - "My English teacher encourages us to report in class and share relevant materials searched on the Internet" (M=3.59), and Q23 - "Before class, my English teacher sends us the courseware created through the software (such as Authorware, PowerPoint and FLASH)" (M=3.48) demonstrate that, most teachers have the ability to share and regenerate the teaching contents, and provide students with digital college English teaching resources via the Internet. Q22 - "My English teacher spends a third of the time in the class to explain and spends the rest of the time to guide us to identify problems, and help us find an effective way to resolve the problems through discussions and exchanges" suggests that, most teachers gradually get rid of the traditional teaching concept, establish the informationized teaching concept, and apply it in practice. Q24 - "In the college English informationized teaching process, the teacher interacts with classmates, organizes, manages and coordinates our study" (M=3.46) shows that, in the process of college English teaching, most teachers use network chat rooms, audio-visual conference and other information technologies to monitor the online learning, answer questions, and give prompt feedback. Q25 - "My English teacher assesses not only our knowledge and skills but also our development of practical ability and emotional development in the informationized learning" (M=3.68) indicates that, the universities have developed the online teaching evaluation management mechanism, and some teachers may receive timely feedback through the Internet. Q26 - "My English teacher tracks our learning process, collects data, mines data, and automatically adjusts teaching strategies" (M=3.68) states suggests that, the English teacher tracks our learning process, collects data, conducts data mining, and adjusts teaching strategies accordingly. The application of big data in education mainly refers to the three elements of online decision-making, learning analysis and data mining. Its main role is to carry out predictive analysis, behavioral analysis, academic analysis and other applications and researches. Big data refers to the analysis of large amounts of data generated in the process of students' learning (data sources include explicit behaviors and implicit behaviors, among which the implicit behaviors include posting, extracurricular activities, online social networking and other activities that are not directly taken as education evaluation; explicit behaviors include test scores, homework completion and classroom performance). The big data model and the data displayed can provide reference for universities and teachers' teaching, so as to evaluate the academic status of students in a timely and accurate manner, identify the potential problems of students, and thus predict their possible future performance (Kay, Kleitman, & Azevedo, 2013, pp. 124-134).

Table 4. Questions on Analysis of College English Teachers' Ability to Manage Teaching Links by Using Information Tools

Questions	Three Universities	
	Mean	Standard Deviation
15. My English teacher encourages us to use APP and iPad terminal modes available on the phone for independent learning.	3.90	.982
16. My English teacher stimulates our motivation to learn in the informationized teaching.	3.59	1.032
17. My English teacher can use the network communication technologies (E-mail, QQ, MNS, etc.) and guides us to learn collaboratively.	3.53	.873
18. My English teacher can monitor our online learning activities and learning process and timely guide us use to resolve problems by using the information technology tools".	3.60	.918
19. My English teacher can use the information technology tool to finish the summary work.	3.37	.982
20. My English teacher sends us the learning materials collected online before class.	3.33	.930
21. My English teacher encourages us to report in class and share relevant materials searched on the Internet.	3.59	.976
22. My English teacher spends a third of the time in the class to explain, and spends the rest of the time to guide us to identify problems, and help us find an effective way to resolve the problems through discussions and exchanges.	3.64	.974
23. Before class, my English teacher sends us the courseware created through the software (such as Authorware, PowerPoint and FLASH).	3.48	.922
24. In the college English informationized teaching process, the teacher interacts with students, organizes, manages and coordinates our study.	3.46	.906
25. My English teacher assesses not only our knowledge and skills but also our development of practical ability and emotional development in the informationized learning.	3.68	.890
26. My English teacher tracks our learning process, collects data, mines data, and automatically adjusts his/her teaching strategies.	3.68	.866

Table 5. Questions on Analysis of College English Teachers' Ability to Promote Students' Informationized Learning

Questions	Three Universities	
	Mean	Standard Deviation
27. My English teacher often tells us how to learn English through the Internet.	3.92	.974
28. Under the guidance of the teacher, now I know what learning methods should be used for independent learning.	3.97	.904
29. Under the guidance of the teacher, now I can study dialectically and learn from the original English literature searched online related to professional knowledge.	3.91	.900
30. Under the guidance of the teacher, I can accurately analyze, judge and evaluate the reliability, effectiveness, accuracy, authority and timeliness of information collected online.	3.82	.942
31. My English teacher develops our information management skills in teaching and teaches us to categorize, store, invoke and inquire different forms of information stored on different media.	3.84	1.150
32. My English teacher fosters the ability to integrate and process information in the Internet environment in teaching.	3.82	.974
33. My English teacher encourages us in teaching to communicate by using informationized tools such as email, ICQ, video conference and the online telephone.	3.90	.958

In traditional society, the purpose of teachers' teaching ability development is mainly to realize the imparting of knowledge and skills and to improve the teaching ability of teachers. However, in the information society, the teaching ability of teachers not only pays attention to the development of teaching ability, but more importantly, the development of teaching ability serves the development of different informationized learning abilities of students. As can be seen from Table 5, Q27 - "My English teacher often tells us how to learn English through the Internet" (M=3.92) states that, the teachers can actively cultivate the students' online independent learning ability. The independent learning ability is the basic ability of independent learning by using online resources, which is the synthesis of various abilities developed through the use of online resources for the independent learning process.

Q28 - "Under the guidance of the teacher, now I know what learning methods should be used for independent learning" (M=3.97) shows that, teachers can teach the independent learning methods to students. Q29 - "Under the guidance of the teacher, now I can study dialectically and learn from the original English literature searched online related to professional knowledge" (M=3.91) illustrates that the teachers can teach students how to find online information. Q30 - "Under the guidance of the teacher, I can accurately analyze, judge and evaluate the reliability, effectiveness, accuracy, authority and timeliness of information collected online" (M=3.82) shows that, the teachers can teach students to dialectically evaluate the network information collected. Q31 - "My English teacher develops our information management skills in teaching and teaches us to categorize, store, invoke and inquire different forms of information stored on different media" (M=3.84) demonstrates that the teachers can develop students' information management skills in teaching. Q32 - "My English teacher fosters the ability to integrate and process information in the Internet environment in teaching" (M=3.82) indicates that, the English teachers can cultivate students' information integration and processing ability in the network environment during the teaching process. Q33 - "My English teacher encourages us in teaching to communicate by using informationized tools such as email, ICQ, video conference and the online telephone" shows that, the English teachers encourage students to communicate by using e-mail, ICQ, video conference, the online telephone and other informationized tools. As an old Chinese saying goes, "It's better to teach a man fishing than to give him fish". In this regards, the teachers should thus focus on guiding students to explore suitable learning methods, including helping students develop the informationized learning ability.

Analysis of the Influencing Factors of College English Teachers' Ability to Develop Students' Informationized Learning

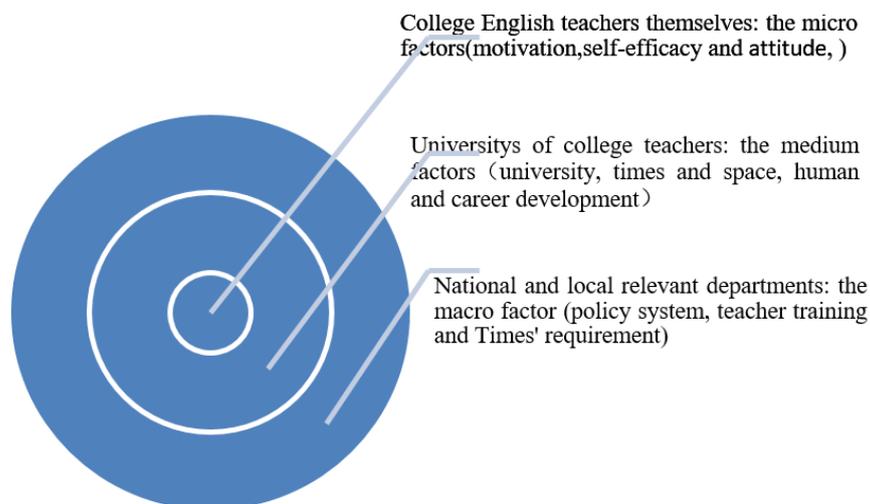


Figure 4. The Sub-factors on the Development of Teachers' Information-based Teaching

As a part of the whole social ecological system, college English teachers are also in a variety of external environments (including the natural environment, social environment and normative environment). Therefore, whether college English teachers use modern information education technology or not is related to the external social environment and atmosphere, and have a close correlation with the surrounding people (Shown in [Figure 4](#)) (Shen & Li, 2017, p .91).

In [Table 6](#), for the development of informationized teaching, research and reflection ability, the predictive variables of ecological factors include institutional factors and demands of the time and training factor. MOOCs, the flipped classroom and micro-class have brought challenges to college education. The improvement of students' informationized learning ability is a prerequisite for the successful implementation of the new teaching model. According to College English Curriculum Requirements, "The new model should be built on modern information technology, particularly network technology, so that English language teaching and learning will be, to a certain extent, free from the constraints of time or place and geared towards students' individualized and autonomous learning." Besides, as the Guide to College English Teaching points out, "The objectives of college English teaching are to cultivate students' ability to use English and develop their independent learning ability." However, in order to promote students' informationized learning ability, much attention should be given to practical operations. At the third national conference on education held in 1999, "The key to the implementation of quality education lies in teachers. To build a high-quality education, we must have high-quality teachers." Therefore, the teachers should play an exemplary role, and motivate students in a positive and progressive manner (Tompsett, 2013, pp. 54-68).

Table 6. Multiple Regression Results of Ecological Factors and Ability to Develop Students' Informationized Learning

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Standard Deviation	Trial		
(Constant)	1.285	1.156		1.112	.268
1. Altitude and awareness	-.056	.076	-.032	-.730	.467
2. Self-efficacy factors	.019	.076	.012	.246	.806
3. Motivation factors	-.081	.113	-.041	-.713	.477
4. "Object" factor in campus	.093	.107	.064	.861	.391
5. "People" factor in campus	-.066	.123	-.035	-.540	.590
6. Career development factor	.052	.073	.035	.702	.484
7. Institutional factors	.461	.093	.188	4.956	.000
8. Demands of the time	.990	.088	.448	11.213	.000
9. Training factors	1.158	.087	.515	13.332	.000

a. Dependent Variable: Development of Students' Informationized Learning Ability

RESULTS

1. The universities do not make enough investments to accommodate the future development needs of smart education: online decision-making, learning analysis and data mining.
2. The teachers show weak ability to use the software, do not master the use of software (such as office software, image processing software, animation software, and video-audio editing software), and fail to implement these. The teachers show weak ability in online decision-making, learning analysis, and data mining.
3. The nation has not issued institutional policies and offered enough time and opportunities for teachers' training.

In traditional society, the purpose of teachers' teaching ability development is mainly to realize the imparting of knowledge and skills and to improve the teaching ability of teachers. However, in the information society, the teaching ability of teachers not only pays attention to the development of teaching ability, but more importantly, the development of teaching ability serves the development of different informationized learning abilities of students. This is not just a formal change, but a change in the value orientation of teachers' teaching ability. The development of teachers' informationized teaching ability is to strike a balance between promoting the development of teachers' teaching ability and enhancing the development of students' learning ability (Chen & Huang, 2018, pp. 1635-1643).

From a policy point of view, on one hand, China should make dynamic adjustments to the assessment and monitoring system of teachers' informationized teaching ability according to the development of the times, and pay more attention to it. On the other hand, China should keep pace with the times in terms of investment in education teaching, and gradually improve its policy supports and incentives. At present, however, the teachers benefit little from the national policy level.

From the perspective of teachers, in the face of developments of the information age, the teachers should see the current situation clearly, adapt to society, change the teaching concept, master the new information technology teaching and make constant improvements and developments. However, the teachers have no energy to be concerned about the changing times in the face of heavy teaching and research tasks.

Although the role and significance of teacher training have been recognized, the practice of teacher training has not been satisfactory. "Today it is indeed hard to say that trainers are better than trainees, especially in teaching methods and arts. Teacher training is often at a level of memory, and the teachers repeat what the book says. However, the development and utilization of micro-teaching and information technology look pale and weak in some training institutions, yet they are widely used in primary and secondary schools. And so on, it is easy for teachers to lose their enthusiasm in elective courses, leading to a waste of time and reduced confidence in training to a certain extent" (Shen & Li, 2017, pp. 109-110).

In short, it is crucial to strengthen training college English teachers based on the modern information technology, effectively improve their information literacy and information capabilities, including the basic theories of information technology (network learning theory, network courses and teaching theory, etc.).

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