Application investigation and technological development of intelligent product in college English teaching

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Abstract. Through quantitative and qualitative research methods, this paper investigated the application of intelligent products in College English teaching in China and proposed its future technological development prospect based on application problem and both teachers’ and students’ practical needs. The survey shows that kekenet.com and Chinese Universities MOOC Network are the most popular intelligent products used by teachers and students due to effective intelligent monitoring and rich resource support function etc. The application problems and product disadvantages include lack of intelligent monitoring and recording system, lack of error identification and correction function, without learning process evaluation and individualized learning guidance etc. The future improvements will be adding listening error analysis in listening intelligent product, adding speech identification and comparison function in speech teaching software, creating translation teaching platform and adding word-in-use technique for vocabulary teaching product etc.

1. Introduction

As Artificial Intelligence is being applied in various fields of education, college English becomes one of the earliest and most popular application areas in China due to study on literature review[1-2]. Increasingly more artificial intelligence system and software are being used by both English teachers and learners whether to assist English teachers in developing, monitoring and checking students’ English learning performance or to promote students’ specific learning interest or proficiency. However, as intelligent products applied in English teaching are still in their infancy, there might be some application problems or development potential, thus it is necessary to do some research in this field.

English teaching in China has long attached importance to teacher’s teaching rather than students’ learning. English teaching should be considered as an interactive process between teachers and students thus the study of English teaching should involve both teaching and learning parts[7]. The application of intelligent product in college English teaching not only helps teachers teach but also helps students learn. It combines teaching with learning naturally and hence is useful to achieve effective teaching. Therefore, when studying AI application, two aspects are included: English teachers’ application of AI and English learners’ application of AI. By comparing teachers’ and students’ preference and application status in using intelligent product, an overview of intelligent product application in college teaching is presented. Due to both teachers’ and students’ applying problem and specific demand, some new technology design and modification are introduced with the purpose of bettering future intelligent product in promoting students’ listening, speaking, reading, writing and translation ability.
2. AI Product and English Teaching

Concisely defining AI is a nearly impossible task as it includes diverse research areas such as robotics, natural language processing and machine learning etc.[5] This paper defines AI as a technology that enables machines to perform intelligent tasks like humans[6]. “Machine Learning” is the key feature of AI. Intelligent product has such feature. It can solve a series of practical problems and acquire experience through machine learning.

The advantage of intelligent product lies in its powerful and fast ability of large data processing, analysis and statistical operation, which can accurately complete complex and difficult statistical tasks and free human beings from heavy scientific and engineering calculation tasks. English teaching is a complex and arduous task, including imparting knowledge and skills, interacting between teachers and students, evaluating learning process and outcome. Application of intelligent products can help teachers release work burden by accomplishing a series of teaching tasks, such as knowledge imparting, skill testing, teaching management, teaching evaluation and so on.

According to literature review, English teaching is the earliest field that AI technology applied to education in China. Jia Jiyou and Chen Weichao published the research paper on the research and application of CSIEC intelligent English tutoring system in English classroom in senior high school in China[1]. A decade later, Liang Yingli and Liu Chen also made some evaluation on the English speaking and writing scoring intelligent product when they investigated the AI products in the field of education in China[2]. However, there are few studies specialized in the research of AI product and its application in college English teaching in China. What’s more, through data analysis, there are more qualitative researches than quantitative studies on AI application, and more normative studies and less empirical studies are conducted by researchers[3]. Therefore, this paper applies the quantitative and qualitative research methods to get an overall picture of AI application in college English teaching including application rate of intelligent product, advantages and disadvantages of certain intelligent product, development prospect and technology improvement for future intelligent product.

3. Application Investigation of Intelligent Product in College English Teaching

3.1. Research questions

This paper mainly investigates the application of intelligent products in College English teaching and answers the following three questions: What are the most favorable and commonly used intelligent products by college teachers and students in English teaching? What are the advantages, problems and application status of intelligent product in college English teaching? What kind of technological improvement should be made on the present intelligent product in order to solve current application problems?

3.2. Research objects

In this study, 300 college students and 30 college English teachers were randomly selected from five universities to investigate the importance and application of intelligent products in daily English teaching and learning. A total of 330 questionnaires were sent out and 320 valid questionnaires were collected. The effective rate was 96%.

3.3. Research methods

This survey mainly adopts the quantitative and qualitative research method with self-designed questionnaire. 20 questionnaire items cover the aspects of application scope, application degree, advantages and disadvantages, problems and attitudes of intelligent products. Data analysis is conducted by Excel and SPSS software.

3.4. Results and discussions

Table 1 shows the most frequently used English teaching products by English teachers. Teachers prefer to use intelligent products to manage in-class and after-class teaching, and monitor students’
daily learning progress and learning outcome. In addition, teachers mainly use the rich resources of various intelligent platforms to enrich teaching content, supplement more background knowledge, diversify teaching methods, and provide learning advice so as to guide students’ learning.

Table 1 Intelligence products most used by teachers in college English teaching

| Rank | Intelligence Product            | Function of Product               | Application Area                      | Application Purpose                      |
|------|--------------------------------|----------------------------------|---------------------------------------|------------------------------------------|
| 1    | Unipus/iTEST/iWrite Learning Platform | English Teaching and Learning Platform | Daily teaching                       | To improve comprehensive English ability. |
| 2    | Chinese Universities MOOC Network | English Teaching and Learning Platform | Daily teaching and learning           | To improve comprehensive English ability. |
| 3    | Rain Classroom Wechat Public Number | Daily teaching                   | To provide learning materials and monitor learning process. |
| 4    | China Daily English Learning Network | Reading and listening learning    | To provide learning materials.        |
| 5    | kekenet.com English Learning Network | Reading and listening learning    | To improve reading and listening ability. |
| 6    | 51 VOA English Learning Network | Reading and listening learning    | To improve reading and listening ability. |

Table 2 presents the most commonly used intelligent learning software among students. By using various kinds of AI learning products, students aim to improve their comprehensive English ability, especially in the aspect of enlarging vocabulary, improving listening and speaking skills and broadening mind. According to the characteristics of intelligent products, students can choose their own learning products according to their own needs and learning requirement. With application of intelligent products, students can enrich their minds and exercise their English skills.

Table 2 Intelligence products most used by students in English learning

| Rank | Intelligence Product          | Function of Product            | Application Area                     | Application Purpose                      |
|------|-------------------------------|--------------------------------|--------------------------------------|------------------------------------------|
| 1    | BAICIZHAN English Learning Software | Vocabulary study              | To increase vocabulary.              |
| 2    | ICIBA English Learning Software | Vocabulary study              | To increase vocabulary.              |
| 3    | NYSE: LAIX English Learning Software | Oral English learning         | To improve English speaking ability. |
| 4    | Himalayan FM English Learning Software | English listening learning   | To improve listening ability.        |
| 5    | kekenet.com English Learning Software | Reading and Listening Learning | To improve reading and listening ability. |
| 6    | Chinese Universities MOOC Network | English Learning Platform      | To improve comprehensive English ability. |

Comparing Table 1 and Table 2, we can find that both teachers and students pay more attention to applying AI products to improve teaching and learning efficiency. Teachers pay more attention to its function of teaching and students pay more attention to its function of learning. Kekenet.com and Chinese Universities MOOC Network are the favorable intelligent learning websites mostly applied by both teachers and students. After interviewing teachers and students, we found that there are some similarities between the two kinds of platforms: 1. network-based with rich teaching resources; 2. all-inclusive column, easy to learn and download; 3. recommendation system catered for users’ learning habits; 4. learning, recording and monitoring function capable of alerting and checking students’ learning performance; 5. exercise and online assignment with machine correction system; 6. automatically sending messages, SMS reminders and with learning task reminders.

According to statistics, teachers and students have different application rate on application of certain intelligent teaching systems and software aiming at improving five specific skills: listening, speaking, reading, writing and translation, as presented in Fig.1 and Fig.2.
Fig. 1 College teachers’ application of intelligent product based on five basic skills

Fig. 1 shows that teachers use writing software more often. This is due to the reason that AI technology applied in Essay Assessment is becoming more mature. Writing evaluation software based on AI uses natural language processing technology and machine learning technology to realize the calculation, analysis and semantic understanding of short text. Writing evaluation software can correct students’ English compositions accurately, quickly and effectively reducing teachers’ heavy workload. E-rater[2] engine also provides real-time diagnosis and feedback on grammar, writing style and organizational structure. With proper evaluation criteria, teachers can assess students’ writing performance and identify their writing weakness so as to help students make some improvement. Reading intelligent product ranks the second place, which is in accordance with China’s English teaching phenomenon that teachers always lay much emphasis on reading and writing instead of speaking and listening.

Although automated oral evaluation system has been developed, such as the Intelligent Test System for Listening and Speaking developed by IFLYTEK CO., LTD.X, CET-4 and CET-6 Oral Examination System and so on, which can be used to promote English listening and speaking ability, the teacher’s application rate is relatively low. In the interview, teachers believe that oral communication is a subjective behavior, however, communication with AI is too objective to test students’ oral proficiency, since students can complete the oral test conducted by AI by reciting and previewing the data bank of test questions. AI oral test cannot help students improve their interpersonal communication ability, and it may also make students neglect the importance of critical and creative mind.

Fig. 2 College students’ application of intelligent product based on five basic skills

Contrary to teachers, students do not pay much attention to writing part while using intelligent products, but lay much emphasis to improving their listening and speaking abilities, which is partly as a result of long-term examination-oriented English teaching methods in Chinese history. In college, students discover that they are weak in English speaking and listening. Intelligent products can help them explore learning interests in oral and listening practice, record learning progress in real time,
tailor learning plans for individuals, and help them make full use of extra-curricular time to compensate for their own shortcomings.

Both teachers and students seldom use translation software to deal with translation problems. Although there are many translation software on the market, such as Baidu translation, Google translation, IFLYTEK translation and so on, whose intelligence level is very high, and their lexical, sentence and grammatical levels are similar to or equal to human level, the translation software invented for English teaching have not yet appeared.

4. Technological Development for Future Intelligent Product Based on Application Problems

4.1. Application problems and development prospect of intelligent products for English listening teaching

Recently intelligent products specialized in improving students’ listening proficiency on the market only focus on the content of listening materials, such as 51 VOA and kekenet.com. Although the product has the basic functions such as word search, search and selection, material classification and so on, there is still a lot of room for improvement because of the insufficient intelligent monitoring of students’ listening and learning time, recording of students’ learning level and learning progress. The intelligent product cannot identify students’ listening problems and put forward suggestions for students so as to make improvement on specific listening field. Therefore, due to above problems, we design the future AI listening teaching system as the Fig.3.

![Fig.3 Future AI English listening teaching system](image)

Future AI English Listening Teaching System includes all kinds of foreign language audio files classified into different categories, such as News Report, Cet-4, Cet-6, IELTS etc. Students can choose to listen to the certain program and submit the exercise results. When listening, the system can record the sentences that students cannot hear clearly or make mistakes while doing listening exercise. According to the submission results, the system automatically judges, and then feeds back the judgment to the students and records the learning problem and progress. After collecting a large number of students’ data, the system presents it to teachers through intelligent data analysis. Teachers can evaluate the effect of oral teaching and students’ oral proficiency. In order to improve students’ learning enthusiasm, some rewards or growth values can also be set according to students’ listening results.
4.2. Application problems and development prospect of intelligent products for oral English teaching

Oral English learning is always a big headache for Chinese learners. Oral intelligent learning software such as NYSE: LAIX provides students with a platform for English imitation. Students can apply it to learn by themselves to improve their oral English. However, some basic speaking problems, for instance, students’ wrong vocabulary pronunciation and sentence intonation problems, cannot be identified and corrected by both students themselves or AI learning product during learning process. Students still have no way to improve their communicative competence. In the future, intelligent products should be capable of pointing out or correcting students’ pronunciation problem and having a real-to-life human-machine communication then it will be more helpful to improve students’ oral English ability.

![Fig.4 Future AI English speaking teaching system](image)

Future AI English Speaking Teaching System follows such working procedure: After input the voice of speech, it is detected, analyzed and processed in order to remove redundant information first. Then the key information and the feature of the speech are extracted through speech recognition system with recognition rules and strategies. The speech is put into AI data bank and made comparison by the system so as to point out students’ pronunciation mistake and give indication. Finally, the results are indicated through Speech Output and Key Point Indication and oral evaluation is displayed.

4.3. Application problems and development prospect of intelligent products for English reading teaching

At present, there are many intelligent products aimed at improving students’ English reading ability, but most of them provide endless reading materials. Although the reading materials and learning content have roughly been divided and classified according to teaching purpose and learners’ learning level, there is no intelligent platform aimed at providing learning materials for students’ individual learning requirements and making up for students’ personal learning weaknesses. Students cannot record new words and good words when reading materials on intelligent platform. Therefore, an integrated learning platform based on reading should be designed to help students take notes while reading. It should be able to record students’ reading process, progress and learning outcome as well, so as to improve students’ reading efficiency.

4.4. Application problems and development prospect of intelligent products for English writing teaching

Artificial intelligence products for writing are mainly used in teaching, correcting students’ writing assignments, and highlighting students’ writing mistakes, which greatly improves teachers’ teaching efficiency. From the perspective of AI technology, it is more mature than intelligent product in other
English teaching field. However, human thinking is far more complex and complicated, and there is a long way for computer to learn and grasp human creativity and thinking. Thus it can be seen that there is a room for further development of AI in writing teaching which involves wide research field referring to language, cognition and algorithm.

4.5. Application problems and development prospect of intelligent products for English translation teaching

Until now the translation software applied to English teaching has not yet appeared. In the future, it would be a good choice to develop an intelligent product for translation teaching, which is capable of checking and correcting students’ translation performance and works, just like writing evaluation software E-rater[2].

Fig.5 Translation evaluation and assessment system

Teachers can set grammar criteria, writing criteria and text structure criteria etc. in Translation Evaluation and Assessment System. When students submit their own translation work, the translation evaluation system will analyze them according to the set criteria and display the corresponding evaluation results. These results can be used as teachers’ teaching evaluation reference to improve students’ translation ability.

4.6. Application problems and development prospect of intelligent products for English vocabulary teaching

In China, English learning belongs to the category of second language acquisition. Therefore, there are many AI products developed for helping students memorize new words. Compared with the AI products, these products are better constructed in system module construction, memory monitoring and learning evaluation. However, there are also some problems such as word reciting without language context, word study out of situation context, word study without word in use practice etc. Future intelligent products on vocabulary learning should refer to human cognition, human language acquisition rules and linguistic theories to enhance the monitoring of vocabulary learning process, focus on the level of language application, solve students’ problems of vocabulary collocation and grammar mistakes when using words, and realize the teaching purpose of “learning for application”.

5. Conclusion

Based on the research and results discussed above, the conclusions are obtained as below:

(1) Both college teachers and students apply intelligent products in daily teaching and learning. Teachers like to use writing and reading product but students prefer to apply speaking and listening product.
(2) There is no intelligent product aimed at translation teaching. Though intelligent evaluation system related to English writing and speaking are sophisticatedly developed, the former are more often applied than the latter by English teachers. Intelligent products aimed at improving students’ listening, speaking and reading ability have some shortcomings such as lack of intelligent monitoring and recording system, error identification and correction function, and learning process evaluation and individualized learning guidance etc.

(3) The future improvements of intelligent products will be adding listening error analysis in listening intelligent product, adding speech identification and comparison function in speech teaching software, creating translation teaching platform and adding word-in-use technique for vocabulary teaching product etc.

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