An Analysis Model of College English Classroom Patterns Using LSTM Neural Networks

Yu Bai

Department of Foreign Language Teaching, Luohe Medical College, Luohe 462000, China

Correspondence should be addressed to Yu Bai; 0193@lhmc.edu.cn

Received 2 February 2022; Revised 19 February 2022; Accepted 21 February 2022; Published 23 March 2022

Academic Editor: Xin Ning

Copyright © 2022 Yu Bai. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

With the advent of the information age, IT represented by mobile computing and neural network has been widely used in various fields of education, and IT has become an indispensable part of university classrooms. Mobile devices can be used to promote teacher-student interaction, and neural networks can be used to update teaching methods. The goal of CET is to help students develop their listening, speaking, reading, and writing skills. Although some studies have discovered a certain level of poor learning adaptability in the practice of AI-supported College English Teaching (CET), the majority of the studies only describe the phenomenon without delving deeper into the causes. The deep integration of AI and education is promoting the growth of a new college English education ecosystem. The research is aimed at understanding the current situation of college students’ English learning adaptability supported by AI, clarifying the influence effect of various influencing factors on learning adaptability and the relationship between learning adaptability and various factors, and proposing strategies to improve students’ learning adaptability through investigation and analysis of college students’ English learning adaptability supported by AI.

1. Introduction

The acceleration of iterative updating of science accelerates the transition from the information age to the intelligent age, and the society enters a new era of intelligence and informatization [1]. Human behavior is largely determined by the environment. Considering human behavior from the interaction of environmental factors and individual factors can reveal the basic law of human behavior [2]. Similarly, the subject behavior in the field of education certainly cannot escape the influence of the environment. Big data, cloud computing, voice recognition, deep learning [3], etc. have become new hot spots after the Internet and the IoT. In recent years, mobile-assisted language learning has gotten a lot of attention, and scholars both at home and abroad have done extensive research on the subject, covering a wide range of topics [4]: language single-skill or multiskill learning, foreign language mobile teaching mode, mobile learning motivation and learning strategy, mobile learning effect and attitude, and so on [5, 6]. Mobile foreign language learning is thought to have a positive impact [7]. The new era’s technological advancements have had a significant impact on education, transforming traditional educational ideas, innovating educational models, and improving teaching methods [8]. The purpose of education reform is to promote education, and the rational use of technology to promote education development is the inevitable trend of education reform and innovation in the new period [9]. Information technology (IT) has become an indispensable part of a college classroom, and many teachers say that multimedia is indispensable to class now. The application of multimedia can not only liberate teachers from the heavy chalk dust, but more importantly, compared with traditional teaching, multimedia teaching is more likely to attract students’ attention and improve their interest in learning [10].

As far as English learning is concerned, technology has always shouldered a crucial task [11]. From the early days, we used phonographs to practice pronunciation, conducted distance learning through wireless broadcasting, used tape recorders for listening and speaking training, started audio-visual learning through video recorders, and used TV sets to achieve large-scale TV teaching [12]. And modern multimedia, network, etc. bring online learning, mobile learning, etc.;
technology has always played the role of "booster" in English learning. English belongs to language teaching, and language teaching is different from teaching in other courses. In addition to teaching grammar knowledge, it is also necessary to cultivate students' interest in foreign cultures. The study of college students' English learning adaptability supported by artificial intelligence (AI) [13] and the creation of the composition structure of college students' English learning adaptability supported by AI are not only a new exploration of learning adaptability in the field of AI English learning but also a supplement to the research results of learning adaptability in information learning [14, 15]. AI-assisted learning, as the research frontier of English education informatization development, has yielded some results in teaching practice [16]. At the same time, there is also a certain degree of poor learning adaptability. Classroom interaction plays an important role in foreign language teaching and has been proven by many scholars to be conducive to language learning, but it is often ignored by teachers. At present, there are many researches on the integration of IT and curriculum, but generally speaking, most of them study the environmental construction and resource development of the integration of IT and curriculum from a macro perspective [17]. Constructing an AI-supported influencing factor model of college students' English learning adaptability provides theoretical support for effectively promoting the improvement of students' intelligent learning quality, which is critical for improving college students' learning adaptability and academic development [18]. Different courses have different teaching methods and learning content, and different IT integration methods and principles should be used as well. Furthermore, the effect of integration will be influenced by various objects. Therefore, the research on IT and curriculum integration should be refined according to its subjects and objects. Only by refining the research results can it be applied to educational practice.

2. The Influence Research and Method of College English Classroom Interaction Mode

2.1. The Influencing Factors of College English Classroom Interaction Mode. The deep integration of AI and education is promoting the development of a new college English education ecology. Through the investigation and analysis of college students' English learning adaptability supported by AI, the research is aimed at understanding the current situation of college students' English learning adaptability supported by AI, clarifying the influence effect of various influencing factors on learning adaptability and the relationship between learning adaptability and various factors, and putting forward strategies to improve students' learning adaptability. The classroom interaction supported by IT breaks the limitations of being unable to obtain visualization and intuition in traditional teaching and organically combines text, graphics, video, animation, and sound technologies, thus changing the interactive behavior of teachers and students in the classroom.

Most of the behaviors of teachers are teaching, and they rarely interact with students. Even if they do, they only ask questions and call the roll of students [19]. In terms of technology, IT refers to a kind of technology that can complete the acquisition, transmission, processing, regeneration, and application of information, including sensing technology, communication technology, computer technology, AI technology, and control technology. In the learning process, students' perceived ease of use and perceived usefulness of the AI English learning platform influence students' attitude and behavior and can predict students' recognition of the learning platform. The research will observe the quality of the resource platform and students' perceived usefulness and perceived ease of use. Figure 1 shows Davis' technology acceptance model.

With the widespread use of IT in universities, people have put forward higher requirements for teachers' information literacy. Teachers should be able to use IT equipment as well as come up with innovative ways to integrate IT and English in the classroom [20]. In college English classes, many students are unaware of the importance of interaction. They refuse to interact with teachers or assist students in correcting their mistakes in a timely manner [21]. Students can increase the storage of language information in the process of output activities such as listening or reading, as well as discussion, dialogue, and problem solving, by interacting with one another. In other words, this teaching model advocates for a student-centered and teacher-led teaching process [22]. Teachers can now more precisely and accurately understand the characteristics and needs of students thanks to AI technology and big data. As shown in Figure 2, create a preliminary model of influencing factors for college students' English learning adaptability using AI.

In the era of AI, teachers no longer need to mark homework and papers in Dai Yue, and marking machines greatly reduce the burden on teachers [23]. The intelligent question bank behind big data can even tailor each student's repetition book according to the students' usual mistakes [24]. Generally speaking, AI is a technical science that simulates human intelligence (perception, memory, learning, thinking, etc.) through programs, data, and algorithms and enables machines to have human functions (recognition, cognition, analysis, decision-making, etc.), involving cross-cutting comprehensive disciplines in many fields such as computer science, information theory, mathematics, neurophysiology, linguistics, and psychology. This definition emphasizes the modernization and high-tech content of IT.

In the learning process, AI can act as an intelligent learning partner, collaborate and interact with learners, improve learner participation, and promote inquiry-based learning. The realization of teaching goals requires the joint efforts of teachers and students and the mutual promotion, mutual restriction, and coordination between teaching. Classroom interaction highlights the characteristics of student-centered teaching and emphasizes and reflects the main role of students. Classroom interaction is a two-way or multidirectional activity process, and the teacher's teaching method largely determines the students' words and deeds in the classroom.

2.2. Strategies of Interactive Teaching in an English Classroom. Interest is the best teacher, so the best motivation for learning is interest [25]. Due to the limited class hours of current CET, students are unable to have more in-depth discussion and practice in an English class. LMS software based on AI technology
Perceived usefulness

Use attitude

Behavior intention

Actual use

Figure 1: Technology acceptance model.

can provide technical support for the whole teaching process, as shown in Figure 3.

The concept of “intelligent education” is an effective integration of AI technology and education [26]. There must be an interactive process to improve the activity level, enhance the interest and attraction of the interaction, make students happy to participate in the English classroom interaction, especially attract students with poor grades to join the classroom teaching interaction, and try to avoid turning the classroom interaction into a patent and performance stage for teachers and excellent students. In the education industry, AI greatly reduces the complex workload of teachers [27]. Language acquisition is to provide a sufficient amount of language materials for learning in communication, which can be understood by learners. Therefore, English teachers should provide more materials about English exercises in class. The choice of these language materials determines the different interaction modes in class. For example, listening materials should be provided in English listening class, dialogue materials should be provided in oral class, and article materials should be provided in reading class [28]. AI can form basic modeling of English learners according to their basic information and then refine their learner types according to their English learning files, providing technical support for creating personalized CET models (as shown in Figure 4).

In pedagogy, adaptation means that the subject of education actively adjusts to meet the requirements of external changes according to the requirements of the future, including both psychological and action adaptations [29]. In addition, there are large differences in the English level of students, and it is difficult for some students with weak English to participate in classroom teaching. The interactive mode of an English classroom is conducive to relieving students’ nervous state, stimulating students’ desire for knowledge and performance, so that students have more opportunities to express their true thoughts and emotions and transmit meaningful information in interactive teaching, thereby strengthening language input and output.

The concept of interaction is inseparable from the support of AI technology. Data is the foundation of AI operation. Having a large amount of effective data is the premise for AI with machine learning and deep learning as the core. As for English listening, the particularity of English listening materials determines the application of IT in classroom interaction. Teachers need a lot of training to effectively improve students’ English listening ability. However, after “inputting” a series of language materials, teachers should also appropriately reserve “output” opportunities for students. To some extent, this determines that the English listening course must be a mixed course based on teachers’ behavior. The main task of teachers is to stimulate students to speak English. Most teachers require students to interact by calling the roll, asking questions, and assigning tasks. The structure of oral English class supported by IT is shown in Figure 5.

In classroom teaching, teachers should systematically explain language knowledge and sort out the difficulties and key points in a targeted manner. Guide students to share and discuss the gains and problems encountered in mobile learning, carry out various forms of practical activities, cultivate students’ comprehensive English application ability, and improve students’ core literacy. Through interaction, students can greatly increase language practice, enhance language accumulation and improve language application ability, enhance their self-learning awareness, cultivate their sense of responsibility and enthusiasm for learning, conduct self-assessment and learning strategy adjustment in a timely manner, and improve their ability to solve problems independently.

3. Interactive Coding Analysis

3.1. An Analysis of College English Classroom Interaction Supported by IT. Since the education circle advocated returning the subject status to students, the teaching interaction between teachers and students has become a hot topic of people’s concern. Coupled with the introduction of IT in class, the nature, characteristics, and ways of teacher-student interaction have undergone great changes. The KMO test and Bartlett sphericity test are used for the validity of AI applied to CET. Form a sample set DT with a structure of \( n - w + 1 \) data samples, each sample has \( w \) time steps, and each time step is composed of \( M + 1 \) features. The sample set has a three-dimensional structure \( (n - w + 1, w, m + 1) \). Then, convert the data set into sample set DS that can be trained by LSTM:

\[
\begin{align*}
DS &= \{(X_1, Y_1), (X_2, Y_2), \ldots, (X_i, Y_i)\}, \\
X_i &= TO_i, \\
Y_i &= t_i + w + 1. 
\end{align*}
\]

Using SPSS 20.0, “factor analysis” was carried out on the sample data, and the analysis results are shown in Figure 6.

Individuals strive to adjust themselves to achieve a balance with the environment due to the objective environment and...
Learning adaptability

- Resource platform
- Learning self-efficacy
  - Intelligent accomplishment
  - Learning motivation
  - Teacher support

**Figure 2:** Hypothesis model of influencing factors of college students’ English learning adaptability supported by AI.

Artificial intelligence

- Teaching method
  - Content of courses
    - Teaching form
- Teaching process
  - Artificial intelligence
    - Structural evaluation
    - Teaching dynamic evaluation
  - Index evaluation

**Figure 3:** Teaching process and evaluation.

Data mining

- Basic document
- Learning archives
- Social archives
- Other files
  - Examination performance
  - Activity participation
  - Hobbies and interests
  - Pictures and text

**Figure 4:** Learner modeling.
their own learning needs. Whether it is Viggo’s theory of the zone of proximal development or Fiore Stan’s confidence in becoming effective learners, structural modification, cognitive tools study, and dynamic evaluation theory, the study of social environment emphasizes the study of interpersonal communication and interaction, with the teacher being the most important object of interactive learners. The result is shown in Figure 7.

The IMF model is a combination model of empirical mode decomposition and long-term memory neural network. The prediction method is single-step prediction; that is, the first k historical data are used to predict the k + 1th data:

$$\text{IMFs} = (\text{imf}_1, \text{imf}_2, \cdots, \text{imf}_m),$$

$$\text{imf}_m = (\text{imf}_{1m}, \text{imf}_{2m}, \cdots, \text{imf}_{nm}),$$

where $\alpha = 0.454\alpha$. If the reliability test results are acceptable, the reliability is better. The reliability test results are acceptable, and the reliability of the questionnaire is good. With the degree of importance in intelligence, the weight $w_i$ of the feature item $t_i$ is usually defined as a function of the frequency of $t_i$ in the document, namely:

$$w_i = \varphi(\text{tf}(t_i)).$$

The dispersion of learning is consistent with the fragmentation of mobile learning, and mobile learning can be carried out based on intelligent applications. In English classroom interactive teaching, teachers should constantly cultivate feelings with students and treat students as friends, which provides a basis for the design of interactive teaching and enhances pertinence and effectiveness. In the age when machines can think, education should focus on cultivating students’ four abilities, namely, autonomous learning ability, problem-raising ability, interpersonal communication ability, and innovative thinking ability. Learning adaptability is the ability of learners to coordinate their psychological and behavioral learning state with the learning environment through self-regulation according to the external learning conditions brought by AI and their own English learning needs, so as to achieve better learning results. Information gain is used to measure the amount of information contributed by the presence or absence of features to category prediction, which can better characterize the distinguishing ability of feature items, that is, the average value of gain. The calculation formula is

$$d_i = \frac{1}{n} \sum_{j=1}^{n} IG(w_{ij}).$$

Learning adaptability in AI learning environment is closely related to learning adaptability in general learning environment and other information learning environment. Mobile learning can build a real English communication environment with the help of the new generation of AI technology, allowing students to truly participate in it. Different influencing factors have different effects on learning adaptability and are directly or indirectly related to each other. Direct effect relationships have direct effects. Indirect influence relation has an intermediate effect, which is equal to the product of effect values among variables in the path. The specific effect values of each influencing factor in the model on learning adaptability are calculated in turn, and the specific results are shown in Figure 8.

Teaching activity is an organic microecosystem. Ecological CET not only includes the active subjects and intermediaries involved in teaching and learning, such as students, teachers, and learning resources, but also includes various conditions or situations needed to effectively carry out teaching work, that is, the main factors of human beings, the environmental factors of the material, and the intervening factors of the spirit. To create a classroom environment conducive to English interactive teaching, it must be interesting and novel in the introduction stage of classroom teaching. It is necessary to use more multimedia and other equipment to increase the freshness of students. In the context of the era of AI, applied undergraduate English teachers reposition their roles. Reestablish training goals with a long-term and sustainable development perspective, and strive to cultivate lifelong learning talents who are independent, self-reliant, and self-improving.

3.2. Analysis on the Construction of the College English Mobile Learning Model from the Perspective of “AI + Education.” The deep integration of AI and education has brought new opportunities for college English mobile learning. If learners are interested in what is being expressed in the language they are learning, their intrinsic learning motivation will be stimulated. In essence, the process of IMF extraction by empirical mode decomposition of AI is to decompose the original feature sequence into the superposition of different vibration cycle fluctuations. Each IMF component finally obtained can be both linear and nonlinear by repeating this process continuously, and then, all IMF components of the time series can be obtained:

$$h_1 = h_0 - \frac{E_{\max}(h_0) + E_{\min}(h_0)}{2}.$$
mean or median and generally uses mean to measure the overall level of variables. Through descriptive statistics, the overall level of college students’ English learning adaptability supported by AI and the adaptation of each dimension are obtained, as shown in Figure 9.

Even though there are many English classroom interactions, the quality is not high. The forms of interaction they adopt are very monotonous, mainly teacher questioning interaction, and the classroom atmosphere is poor. Teachers are the people who accompany students to move forward in the thorns of the AI era. They are the people who give students the ability to break old knowledge and create new knowledge by giving them the ability to learn autonomously and think innovatively, so as to guide and help students become irreplaceable, independent, and self-improving lifelong learners.

In the process of mobile learning, AI technology can be used to expand students’ English language input, give students more space to construct knowledge independently, create personalized scenes of using language to practice, and promote students’ language output. The recurrent neural network repeatedly applies the neural network structure of the same structure at different time steps. The hidden layer output of the previous step is connected to the neural network of the current time step by weight. The hidden layer
output of the current time step can be expressed as

$$h_t = f(x_t, h_{t-1}), \quad (6)$$

where $h_t$ is the current time step output, $h_{t-1}$ is the previous time step output, and $x_t$ is the current time step input data also containing an important unit, namely, memory unit, which contains historical information characteristics and is the key to solve the long-term dependence of a cyclic network.

The values of GFI and RMSEA need to meet the requirements of model fitting, so the fitting effect between the model and the survey data is better. GFI structure can be defined as

$$i_t = \sigma(Wx_t + Uh_t - 1 + Vr_t - 1 + b_t), \quad (7)$$

where $x_t$ is the input data of the current time step (time $t$).

The curve comparison between GFI and RMSEA is shown in Figure 10.

In addition, in the AI learning environment, students have more subjectivity and gain more autonomy and freedom, and they change from the original recipient of knowledge to the builder of knowledge and really change from “educated” to “learners.” Teachers can choose a variety of college English learning resources and assign tasks according to students’ different chemistry conditions. Students can carry out independent learning at any time and anywhere with the help of various intelligent platforms. The fitting
degree of the model is tested by each adaptation index. According to the adaptation standard of each indicator, if the model is within the standard range, it means that the model has a good fitting degree and can no longer be adjusted. If the model is not within the standard range, it needs to further modify the model. After operation, specific adaptation indicators and fitting results are shown in Figure 11.

The primary task of English learning is “learning” rather than “teaching.” The purpose of modern CET focuses on cultivating students’ language application ability and autonomous learning ability. Classroom interaction is a communicative practical process of transmitting information. It is the inevitable requirement of the internal essence of teaching. Nowadays, data mining technology relies on AI to deeply mine web-based learners’ learning archives, social archives, and other archives. Through the technology of machine in-depth learning, the data is integrated to model the portrait for learners and form quantitative, qualitative, and dynamic analysis. A simple method is to convert the path coefficient (β). The weight is defined as the sum of the weights of its components, namely:

\[
 w(\text{class}_i) = \sum_{w_j \in \text{class}_i} w(w_{ij}).
\]  

After the model fitting test, the hypothesis path is further tested. The test results of SRMR and NFI are shown in Figure 12. All path assumptions in the revised model are supported, and the mean coefficients (β) of all paths are positive, indicating significance.

The online classes have a lot of content, come in a variety of formats, and can be taken at any time. To achieve personalized
learning, students conduct targeted “fragmented learning” online based on their own interests, needs, and weaknesses. Finally, students will gradually acquire fragmented knowledge based on their individual needs. Create your own knowledge management system. In order to achieve better development in the personalized learning of AI, students must not only be able to adopt appropriate learning methods and strategies for learning problems but also be able to formulate personal learning plans based on teaching objectives, as well as conduct self-supervision and summary evaluation during the learning process. The intelligent learning system allows teachers to assign tasks to students. Teachers will give precise guidance to students based on the feedback results, which will be provided by the machine in real time.

Therefore, in order to realize the transformation from being “teacher-centered” to “student-centered.” The college English classroom should follow the principle of “learning on teaching” and establish the concept of “teaching based on learning.” Rich hardware equipment will also bring many choices for teachers to design interactive activities. Students can interact through computers, the Internet, interactive electronic whiteboards, and other devices, which not only helps to cultivate students’ self-inquiry ability but also improves their ability to learn independently.

4. Conclusions

At present, it is an important period for the integration of AI and education, and the importance of AI in education reform is self-evident. The integration of AI and college English can provide diversified teaching resources, personalized learning methods, and intelligent teaching management and open up new ideas for CET. How to cultivate students’ ability to communicate information in English in teaching requires the implementation of student-centered classroom teaching form, the creation of an atmosphere to express ideas in English, and efforts to achieve effective interaction between teachers and students and students in the teaching process. AI can receive all kinds of network resources and all kinds of training data of learners to the background and conduct feature data mining through deep learning, which provides infinite development space for human cognition level. The frontier of English education technology development research is AI-based English learning. The usability, richness, and advancement of multimedia teaching resources all have a significant impact on classroom interaction in multimedia teaching. Under the influence of AI, the college English classroom mode can increase students’ enthusiasm for participating in the teaching process, satisfy their thirst for knowledge, cultivate students’ autonomous learning ability, and fully exploit their autonomy and initiative.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The author does not have any possible conflicts of interest.

Acknowledgments

This study was supported by the Research Project of Henan Federation of Social Sciences: A Study on English Classroom Model in Vocational College from the Perspective of Learning Community (Serial Number SKL-2020-1376).

References


