Proceedings of the 2nd International Conference on Global Politics and Socio-Humanities
DOI: 10.54254/2753-7048/73/20241031

The Feasibility of Integrating Natural Language Model in Daily English Education

Jingyi Wei[1,a,*]

[1]*University of Surrey, Guildford, GU2 7XH, United Kingdom*
a. changli@ldy.edu.rs
**corresponding author*

Abstract: AI has penetrated into human daily life. In light of the escalating advancements of artificial intelligence (AI) and natural language processing (NLP) technologies, new teaching tools and methods have emerged in the field of education. Through literature review and analysis, this paper discusses the feasibility of NLP in daily English education. On the first step, this paper introduces the basic concepts of AI and NLP and their application fields in education, as well as the application of AI in different stages of education. Through case studies, the application of NLP technology in English education is demonstrated, and the assistance of NLP technology to teachers' teaching and students' learning is analyzed. On the second step, the paper discusses the potential advantages and challenges of NLP in English language teaching, including further optimizations on these tools and how to effectively integrate them into existing teaching frameworks. Finally, the paper concludes that the application of NLP technology in English teaching is feasible and has important potential. The paper also aims to provide a new direction for AI-integrated education and provide pedagogical thinking and direction for the compilation of future models.

Keywords: English education, natural language processing, AI in education, machine learning.

1. Introduction

Artificial Intelligence (AI) is a branch of computer science that seeks to understand the nature of intelligence and produce a new class of intelligent machines that can react, learn, reason, and make decisions in a manner similar to human intelligence[1]. Natural Language Processing(NLP) is an important branch of AI and linguistics. The goal of NLP is to bridge the gap between human language and computers, enabling computers to perform tasks such as speech recognition, natural language understanding, natural language generation, machine translation, text mining, sentiment analysis, language prediction models, etc[2]. With the advancement of technology, deep learning and machine learning have been proposed to make NLP models more intelligent. Therefore, whether NLP is suitable for English teaching has also aroused heated debate.

This paper uses the Secondary Research method and literature analysis to explore the main research question of "the feasibility of integrating natural language model in daily English grammar teaching". By reading a series of cutting-edge literature, this paper considers how natural language model can assist teachers in better English teaching and how to increase students' learn efficiency, hence, to develop a new English teaching model.

DOI: 10.54254/2753-7048/73/20241031

Presently, the research on AI in education is abundant while the academic research on the application of NLP in education, especially in English teaching, is relatively few, which creates research gap and exploration space for pedagogy and technology area. Therefore, through systematic research and in-depth analysis, this paper will analyze the current situation of NLP combined with English teaching in the academic circle, and explore the feasibility of introducing NLP into English teaching from the perspectives of advantages, risks and challenges. Furthermore, this paper is aiming to provide new directions for AI combined education and provides pedagogical thinking and direction for the compilation of future models.

2. AI in English Education

Presently, the application of AI large models in education is common. AI's text processing ability and content understanding ability are well reflected, which enables them to deal with complex NLP tasks. BERT(Bidirectional Encoder Representations from Transformers) is a pre-trained language representation model developed by Google that understands text by considering bidirectional information in context and has been used for a variety of NLP tasks, including text classification, sentiment analysis, and a question-and-answer system[3].The GPT model, developed by OpenAI, is particularly good at generating natural language text and can be used for writing AIDS, dialogue systems, and content creation[4]. The TransformER-XL is an extension of the Transformer model, which improves language understanding by better handling long-distance dependencies and is suitable for teaching scenarios where longer text needs to be understood. Word Embeddings from Language Models (ELMo) capture the complex semantic relationships of words, phrases, and sentences through deep bidirectional language representation, helping to improve language understanding in language learning applications[5].

3. NLP in English Teaching

NLP is used to transform human language into machine models, which makes machines able to understand human language. In reserve, it is worth analyzing whether the transformation form of NLP can help students learn the language.

3.1. History of NLP in Education

The introduction of NLP into educational technology can be traced back to the early 1970s. In 1960, Burton J. Cox and Edward T. Redmond developed an early intelligent tutoring system called the PLATO system, which was an early example of NLP applications in educational technology and marked a major advance in modern educational technology. In 1999, Koedinger, et al., published research on the Andes Intelligent Tutoring System, a tracking tutoring system (MTT) that used rules to capture domain knowledge and track students' input [6].In 2003, Graesser, A. C., et al., developed AutoTutor, an intelligent tutoring system with natural language conversation capability that provides instructional feedback through dialogue. Mitrovic, A. et al. developed EER-Tutor, an intelligent constraint-based tutoring system for teaching database design[7].

As technology advances, the application of NLP in education has become more extensive and in-depth, providing powerful tools for personalized learning and automated assessment.

3.2. Main NLP Models

Based on the development of AI large models, the NLP capability of computers has been greatly improved, and several NLP models have been successfully applied to English education.

DOI: 10.54254/2753-7048/73/20241031

Auto-Tutor is a conversational intelligent tutoring system capable of natural language communication with students, providing personalized learning support and feedback.[8] ELLSA (English Language Learning via Spoken Answers) is a speech recognition and language analysis tool that designed to help non-native English students improve their speaking skills. It assesses students' pronunciation, grammar, and fluency and provides immediate feedback[9]. Duolingo is a popular language learning app that uses NLP technology to create language exercises and tests. By analyzing users' input, Duolingo can provide personalized learning recommendations and feedback[10]. Grammarly is a writing aid that uses NLP technology to check for grammar errors and provide expression suggestions. It is widely used in education to help students and professionals improve their writing skills [4].

These cases demonstrate the diverse applications of NLP technology in English teaching among different area.. There is a series of AI models are suitable for learning English are not analyzed such as ChatGDP, Speak and so on, as the main purposes are not for English learning.

3.3. Literature Review of Adapting NLP in English Education

Various researchers have different opinions on whether NLP is helpful to English teaching and whether it is necessary to introduce NLP into English teaching. Supporters of NLP believe that the introduction of English learning is very effective. However, there are also many objections need to be awared.

3.3.1. Agree with Adapting NLP

The integration of NLP into English education has a set of advantages and potential, and many scholars support the integration.

A systematic literature review written by Paladines, J., & Ramirez, J., concludes intelligent tutoring systems (ITS) incorporating natural language dialogue over the past two decades, discussing how ITS can use NLP to provide personalized feedback, the research also highlights the application and progress of NLP in educational dialogue systems[11].Additionally, the paper written by Maria-Dorinela D. et al shows that NLP technology plays a positive role in analyzing and visualizing learner interaction and learning materials. Moreover, she discussed the feasibility of using NLP technology to analyze learners' language and collaboration patterns and evaluated learning outcomes through text complexity indicators to help readers better understand how to learn texts through data mining[12]. Diane Litman believes that NLP technology can effectively enhance the personalized learning experience. With automatic essay scoring and instant feedback capabilities, students can get targeted instruction faster, thereby improving their writing skills and language abilities[9]. Moreover, NLP can help teachers grasp how well students understand knowledge by analyzing students' conversations.

3.3.2. Disagree with Adapting NLP

Although there are many opinions supporting the integration of NLP into English education, objections remain as some of researchers think NLP is not mature enough.

Sian Bayne is skeptical about the widespread use of NLP in English language teaching, mainly concerned that an over-reliance on technology may lead to less interaction between teachers and students, which in turn weakens teachers' understanding of students' individual needs. Moreover, the ability of NLP to accurately handle complex language use and cultural differences has been questioned[13]. Fuchs, K. and Sian Bayne share the same attitude, concerned about the accuracy and reliability of the NLP system, and the possibility that the automated grading system may not fully understand complex language structures or students' creative expression[14]. Neil Selwyn argues that NLP technology may reinforce the tendency of standardized assessment, ignoring the creativity and

DOI: 10.54254/2753-7048/73/20241031

diversity of language learning. He noted that automated grading systems tend to focus on form rather than content, which can limit students' freedom to express their ideas. Rose Luckin is cautious about the adoption of NLP, focusing primarily on the ethical and privacy implications of the technology. She noted that the mass adoption of NLP technology could raise data privacy concerns while the collected data may used for other purposes[15].

In general, scholars hold different opinions for applying NLP in English teaching. These different views reflect the complex thinking of the educational community on the balance between technological innovation and teaching practice.

4. Discussion

According to the appellate literature review analysis, educational scholars hold different opinions on the introduction of NLP. However, with the advancement of machine learning models, especially the emergence of deep learning technologies, NLP has made remarkable progress in language recognition, understanding and generation, and the development of these technologies has provided strong technical support for English teaching[14]. Furthermore, NLP can help teachers analyze students' writing or answers and extract language mistakes from them, which provides more accurate teaching strategies for teachers and helps students overcome language difficulties. By recognizing the structure and context of sentences, NLP can detect grammatical errors in sentences and provide students with a more natural way to express language. Finally, the NLP driven dialogue system can simulate real-life English conversation scenes to help students practice speaking and listening. Multiple studies have demonstrated the positive impacts of NLP technology in improving students' language skills, motivation and engagement.

Apparently, there are still some difficulties for NLP models to overcome. The accuracy of NLP models' grammatical error correction ability cannot be guaranteed. Over-reliance on NLP tools can weaken students' problem solving ability and critical thinking skill. NLP systems typically need to process large amounts of personal learning data, which can raise privacy and data security concerns. And NLP has extreme requirements for equipment and network, and the upfront investment cost is high[9]. Finally, English teaching is not only about the development of language skills, but also about cultural understanding and context perception. However, the current NLP model basically stops at understanding the literal meaning of a statement. Therefore, NLP models need to be further optimized. Improvements can be done through the inclusion of multicultural conversations and texts in training sets, and through techniques such as transfer learning that enable models to understand and generate language tailored to specific contexts.

5. Conclusion

According to the finding above, the application of NLP technology in English teaching is feasible and has significant potential. NLP technology can help teachers collect various kinds of student information and have the ability to analyze the huge data. The ability of NLP models can help teachers understand the individual differences of students better with less time consuming, which reduce the burden of teachers' work and let teachers pay more attention to teaching design and student subjects. For the student perspective NLP's grammatical and syntactic analysis ability, timely feedback ability and simulation communication ability can conveniently improve students' English pragmatic skills. In addition, this attempt is very conducive to the reform and progress of English education methods, and will stimulate innovation in both technology and education areas. However, the privacy and security of data are key challenges for NLP models. Meanwhile, excessive reliance on NLP will also weaken students' independent thinking and problem-solving ability. Moreover, the accuracy of the NLP models cannot be guaranteed.

DOI: 10.54254/2753-7048/73/20241031

With the continuous progress of technology and the deepening of educational practice, NLP will play a more important role in English teaching in the future. Future research should focus on how to further optimize these tools and how to effectively integrate them into existing teaching frameworks. In order to solve the problem, the language error correction ability of large models can be more accurate through more precise training in the future. For data privacy protection, the government can introduce a series of policies to protect it. The advantages of integrating NLP into English teaching far outweigh its risks, so it is worth further research. There could be deeper collaboration between researchers in fields such as education, computer science and linguistics.

References

[1] *Bandara, W. M. H. K., & Senanayaka, S. G. M. S. D. (2024, April). Use of Artificial Intelligence in Education: A Systematic Review. In 2024 International Research Conference on Smart Computing and Systems Engineering (SCSE) (Vol. 7, pp. 1-5). IEEE.*

[2] *Ezzaim, A., Dahbi, A., Haidine, A., & Aqqal, A. (2023). AI-based adaptive learning: A systematic mapping of the literature. Journal of Universal Computer Science, 29(10), 1161.*

[3] *W. Holmes, M. Bialik, and C. Fadel, "Artificial intelligence in education," Boston: Center for Curriculum Redesign, vol. 2019, pp. 1–35, 2019.*

[4] *Raheem, B. R., Anjum, F., & Ghafar, Z. N. (2023). Exploring the profound impact of artificial intelligence applications (Quillbot, Grammarly and ChatGPT)on English academic writing: A Systematic Review. International Journal of Integrative Research (IJIR), 1(10), 599-622.*

[5] *Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., ... &Li, Y. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020..Complexity, 2021(1), 8812542.*

[6] *Burstein, J., Tetreault, J., & Madnani, N. (2013). The e-rater® automated essay scoring system. In Handbook of automated essay evaluation (pp. 55-67). Routledge.*

[7] *Graesser, A., & D'Mello, S. K. (2011). Theoretical perspectives on affect and deep learning. In New perspectives on affect and learning technologies (pp. 11-21). New York, NY: Springer New York.*

[8] *Nadkarni, P. M., Ohno-Machado, L., & Chapman, W. W. (2011). Natural language processing: an introduction. Journal of the American Medical Inform tics Association, 18(5), 544-551*

[9] *Shaik, T., Tao, X., Li, Y., Dann, C., McDonald, J., Redmond, P., & Galligan,L. (2022). A review of the trends and challenges in adopting natural language processing methods for education feedback analysis. Ieee Access, 10, 56720-56739.*

[10] *Munday, P. (2017). Duolingo. Gamified learning through translation. Journal of Spanish Language Teaching, 4(2), 194–198.https://doi.org/10.1080/23247797. 2017.1396071*

[11] *Paladines, J., & Ramirez, J. (2020). A systematic literature review of intelligent tutoring systems with dialogue in natural language. IEEE Access, 8, 164246-164267.*

[12] *Dascalu, M. D., Ruseti, S., Dascalu, M., McNamara, D. S., Carabas, M., Rebedea, T., & Trausan-Matu, S. (2021). Before and during COVID-19: A Cohesion Network Analysis of students' online participation in moodle courses. Computers in Human Behavior,121, 106780.*

[13] *Knox, J., Williamson, B., & Bayne, S. (2020). Machine behaviourism: Future visions of 'learnification'and 'datafication'across humans and digital technologies.Learning, Media and Technology, 45(1), 31-45.*

[14] *Fuchs, K. (2023). Exploring the opportunities and challenges of NLP models in higher education: Is Chat GPT a blessing or a curse? Frontiers in Educati on, 8Article 1166682.*

[15] *Selwyn, N. (2021). Education and technology: Key issues and debates. Bloomsbury Publishing.*