Uluslararası İleri Doğa Bilimleri ve Mühendislik Araştırmaları Dergisi
Sayı 8, S. 72-75, 8, 2024

Araştırma Makalesi

IJANSER

International Journal of Advanced Natural Sciences and Engineering Researches
Volume 8, pp. 72-75, 8, 2024

Research Article

https://as-proceeding.com/index.php/ijanser
ISSN: 2980-0811

EXPLORING THE POTENTIAL OF NLP IN ENHANCING COMMUNICATION SKILLS IN ESP

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(Received: 10 September 2024, Accepted: 18 September 2024)

(3rd International Conference on Scientific and Innovative Studies ICSIS 2024, September 11-12, 2024)

ATIF/REFERENCE: Prodanovska-Popovska, V. & Najdovski, B. (2024). EXPLORING THE POTENTIAL OF NLP IN ENHANCING COMMUNICATION SKILLS IN ESP. *International Journal of Advanced Natural Sciences and Engineering Researches*, 8(8), 72-75.

Abstract – English for specific purposes is one of the key factors for success and further development both for students of higher education and for all those who need it. Effective communication is one of the key factors for successful work. With the rapid growth and development of information and communication technology, traditional methods of teaching communication skills in ESP are facing challenges. One of the main challenges is certainly artificial intelligence. Keeping up with new trends in ICT is essential for Natural Language Processing (NLP). A subset of artificial intelligence that deals with the interaction between computers and human language offers promising solutions to these challenges. NLP technologies, which include speech recognition, text analysis, and automatic feedback systems, can provide enhanced learning experiences and support the development of communication skills in ESP.

Keywords – NLP, ICT.

I. INTRODUCTION

In higher education, English for Specific Purposes (ESP) plays a critical role in preparing students for professional and academic success by focusing on the language skills required in specific fields. Effective communication is essential in ESP, enabling students to engage with complex disciplinary discourse and perform professional tasks. However, traditional methods of teaching communication skills in ESP face challenges such as limited interaction time, varying proficiency levels, and the need for personalized feedback. **Natural Language Processing (NLP**), a subset of artificial intelligence that deals with the interaction between computers and human language, offers promising solutions to these challenges. NLP technologies, which include speech recognition, text analysis, and automated feedback systems, can provide enhanced learning experiences and support communication skills development in ESP. This paper explores the potential of NLP in improving communication skills in ESP courses, with a particular focus on food science and technology.

II. MATERIALS AND METHOD

While the incorporation of Natural Language Processing (NLP) technologies into English for Specific Purposes (ESP) instruction offers numerous advantages, it also brings a unique set of challenges that educators, technologists, and institutions must address to realize its full potential. One of the most significant challenges in integrating NLP into ESP lies in the technical limitations of current NLP tools. These tools, often developed for general language processing, are not always equipped to handle the specialized and highly specific terminology prevalent in fields such as biotechnology, food science, and engineering. For example, in biotechnology, terms like "recombinant DNA," "CRISPR," or "genome sequencing" may be misunderstood or incorrectly processed by general NLP systems that are not tailored to these technical vocabularies (Bojar et al., 2016). This issue can lead to inaccurate feedback, which may confuse learners or even hinder their understanding of essential concepts. Furthermore, the computational demands of NLP systems pose another level of difficulty. Advanced NLP applications, such as machine translation, speech recognition, and automated writing evaluation, require substantial computational resources, including high processing power, significant memory, and access to extensive datasets. These requirements can be challenging for educational institutions, particularly those with limited budgets or outdated technological infrastructure, to meet. The reliance on cloud-based processing, often necessary for real-time feedback and large-scale data handling, also introduces potential issues related to internet accessibility and speed, which can vary widely across different regions and institutions. In addition to technical challenges, there are important pedagogical considerations when integrating NLP into ESP instruction. Instructors, who are at the forefront of implementing these technologies in the classroom, may not have the necessary training or expertise to effectively use NLP tools. The use of these tools requires a different set of skills compared to traditional teaching methods, including an understanding of how to interpret and apply the feedback generated by NLP systems. Without proper training, educators may struggle to integrate these technologies in a way that enhances, rather than detracts from, the learning experience (Cunningham, 2020). Moreover, there is a concern that the increasing reliance on NLP tools could lead to a diminished role for teachers in the classroom. While NLP technologies are designed to assist in language learning by providing instant feedback and facilitating individualized learning experiences, there is a risk that over-reliance on these tools could undermine the importance of human interaction in the learning process. For example, students might become overly dependent on automated writing evaluation systems for correcting errors and improving their writing, rather than developing the critical thinking skills necessary to self-edit and refine their work. This potential shift in the teaching dynamic raises questions about the long-term impact of NLP on language education and the role of educators in a technology-driven classroom. The integration of NLP in ESP also raises significant issues related to accessibility and equity. The availability of NLP tools is often unevenly distributed, with well-funded institutions and students in developed regions having greater access to these technologies than their counterparts in less developed areas. This discrepancy can worsen existing educational inequalities, as students without access to advanced NLP tools may find themselves at a disadvantage compared to those who can regularly use these resources for learning and practice (Sweeney, 2013). Additionally, the cost of acquiring and maintaining NLP technologies can be prohibitive for many institutions, particularly those in developing countries, further widening the gap in educational opportunities. Beyond physical access to NLP tools, there is also the challenge of addressing biases inherent in these systems. NLP models are typically trained on large datasets that may not fully represent the diversity of linguistic and cultural backgrounds found in ESP classrooms. For instance, an NLP system trained predominantly on Western English may struggle to accurately process the speech patterns or writing styles of students from non-Western backgrounds or other origins. These biases can lead to misinterpretations, unfair assessments, and potentially discriminatory outcomes, particularly for students who speak English as a second language or come from underrepresented linguistic communities. Ensuring that NLP systems are inclusive and fair is crucial for promoting equity in language education.

III. RESULTS

Text Mining and Summarization for Reading Comprehension

Students in a food science ESP course use an NLP-based text mining and summarization tool to analyze academic papers and industry reports. The tool extracts key terms and generates summaries to aid comprehension. The tool helps students understand complex texts by highlighting important terms and providing concise summaries. As a result, the students may acquire enhanced reading comprehension and better preparation for class discussions and assignments. Increased ability to analyze and synthesize technical information (Manning et al., 2008).

TextRazor

TextRazor is a text analysis API that offers features such as entity extraction, sentiment analysis, and summarization. It helps users understand and analyze large volumes of text. It can be accessed at: [TextRazor](https://www.textrazor.com/) with two options: Free Access: TextRazor offers a free tier with limited API requests per month.Premium Access: For higher usage and additional features, there is a paid plan. Students can use TextRazor to analyze academic papers and industry reports on food science topics. The tool helps extract key terms and generate summaries to aid comprehension.

SMMRY

SMMRY is a text summarization tool that condenses articles and documents into concise summaries. It is useful for quickly grasping the main points of lengthy texts. It can be accessed at: [SMMRY](https://smmry.com/), with Access- SMMRY is a free tool with no subscription fees, although it may have some limitations on the length and number of documents processed. Students can use SMMRY to summarize research papers and reports related to food science, making it easier to understand complex information and prepare for class discussions. These tools and examples provide practical applications of NLP in enhancing communication skills within ESP courses. Each tool can be integrated into the learning environment to support various aspects of language development, from writing and speaking to reading comprehension. To summarize, while the aforementioned tools are generally accessible to all users, many require a subscription or payment for premium features, and some have limited free usage. To summarize, one of the key technical challenges in integrating Natural Language Processing (NLP) into English for Specific Purposes (ESP) is the specialized terminology used within specific disciplines like food science. Most NLP tools are trained on general language data, which can result in inaccuracies when processing technical language. To address this, there is a need to develop NLP models specifically tailored to these specialized domains. This would involve curating large datasets from discipline-specific literature and training models to recognize and accurately process technical terms and context (Bojar et al., 2016). Resource intensity is another significant challenge. Advanced NLP models often require substantial computational power, which can be a barrier for educational institutions with limited resources. Utilizing cloud-based services and open-source tools offers a way to reduce these computational costs while still providing powerful NLP capabilities. Institutions could also collaborate with technology providers to access discounted or tailored solutions for educational use (Jurafsky & Martin, 2021). Balancing technology and human interaction is another challenge. While NLP tools can provide immediate feedback and support personalized learning, they should not replace the valuable interactions between teachers and students. The role of educators in guiding and contextualizing the use of these tools is crucial to ensure that the learning experience remains holistic and engaging (Chowdhury, 2003). Accessibility and equity are critical considerations when integrating NLP into ESP. The digital divide remains a significant barrier, with unequal access to technology potentially exacerbating educational inequalities. Developing offline versions of NLP tools and ensuring that they are accessible to

students from all backgrounds is essential to avoid widening this gap. Additionally, there is a need to create inclusive NLP models that account for diverse linguistic and cultural backgrounds, ensuring that these tools are equitable and do not perpetuate biases (Sweeney, 2013). Cultural and linguistic biases in NLP systems can affect how language is processed and understood, potentially leading to misinterpretations or unequal treatment of non-native English speakers. Addressing these biases requires ongoing research and development to refine NLP models and ensure they are representative and fair (O'Neil, 2016).

IV. CONCLUSION

Natural Language Processing (NLP) holds significant potential for enhancing communication skills in English for Specific Purposes (ESP), particularly in specialized fields like food science. By offering personalized feedback, contextualized learning experiences, and interactive practice, NLP tools address key challenges in language education and support the development of essential communication skills. The integration of NLP into ESP courses can help bridge the gap between general language learning and the specialized language needs of specific disciplines, providing students with the tools they need to succeed in their academic and professional careers. While the challenges related to technical limitations, pedagogical concerns, and accessibility need to be managed, the opportunities presented by NLP are substantial. With careful implementation and ongoing refinement, NLP can become a powerful tool in the ESP educator's toolkit, enhancing the quality of language education and better preparing students for the demands of their respective fields. Future research and innovation will continue to expand the possibilities for integrating NLP into ESP curricula. By fostering collaboration between educators, technologists, and domain experts, the field can ensure that NLP tools are both effective and equitable, ultimately contributing to more effective and engaging language education for specialized fields like food science.

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