

ENGLISH LANGUAGE TEACHING AND LEARNING TECHNIQUES APPLIED TO HIGHER EDUCATION STUDENTS: IN THE AGE OF ARTIFICIAL INTELLIGENCE

EVELYN CAROLINA MACIAS SILVA

Escuela Superior Politécnica de Chimborazo

Grupo de Investigación ESPASCI

<https://orcid.org/0000-0001-7593-6952>

evelyn.macias@esPOCH.edu.ec

DIANA CAROLINA CAMPAÑA DÍAS

Escuela Superior Politécnica de Chimborazo (ESPOCH)

Facultad de Informática y Electrónica

Carrera de Software, Electrónica y Automatización, Telemática

diana.campania@esPOCH.edu.ec

<https://orcid.org/0000-0002-7608-4090>

ELISA GUADALUPE SÁNCHEZ HERNÁNDEZ

Universidad Técnica de Ambato

Centro de Idiomas, Ambato Tungurahua, Ecuador

Magister en la Enseñanza del Idioma Inglés como Segunda Lengua

elisagsanchezh@uta.edu.ec

<https://orcid.org/0000-0003-2264-3659>

SANDRA PAULINA PORRAS PUMALEMA

Facultad de Mecánica Escuela de Ingeniería Automotriz

Escuela Superior Politécnica de Chimborazo (ESPOCH)

sandra.porras@esPOCH.edu.ec

<https://orcid.org/0000-0001-6571-9938>

Abstract

Through this document, it was possible to analyze the main characteristics of the volume of scientific production regarding the study of the variables English Teaching, Higher Education and Artificial Intelligence. A bibliometric analysis was proposed to analyze details such as Year of Publication, Country of Origin of the publication, Area of Knowledge in which the published research is carried out and the Type of Publication most frequently used by the authors of each document published in high-impact journals indexed in the Scopus database during the period between 2017 and 2022. Among the main findings, it was possible to determine that, for the execution of the different research methodologies, the report of 61 scientific documents related to the study of the application of tools derived from technological advances in Artificial Intelligence at the service of Higher Education,



properly in the teaching of the English language, was achieved. The maximum number of publications in a year was 28 papers submitted in 2022. The country of origin of the institutions that reported the highest number of records in Scopus was China with 41 documents. The area of knowledge with the greatest influence at the time of executing the research projects that resulted in scientific publications was Computer Science, which contributed great theoretical material in a total of 44 publications. Finally, the type of publication most frequently used to publicize findings from the analysis of the aforementioned variables was the Conference Article, which represented 49% of the total scientific production.

Palabras clave: TEACHING ENGLISH, ARTIFICIAL INTELLIGENCE, HIGHER EDUCATION.

1. INTRODUCTION

Currently the learning of the English language is a latent need in the student community, thanks to any process derived from the effects of globalization, and the recognition of this language as the universal language, with which a close relationship is preserved in international scenarios, therefore university students identify the obligatory nature almost, of English proficiency, as an added value to their Resumes and a better performance within the execution of tasks related to their professional careers. Therefore, higher education institutions have understood this need and have sought ways to integrate the teaching of English with professional training, and a very useful tool within this objective has been the implementation of digital resources within the fulfillment of academic objectives. These tools, today manage to involve principles of Artificial Intelligence in the feeding of data supplied to educational systems that achieve the interpretation of student behavior within digital platforms, thus identifying the individual needs of each of the actors involved in the teaching-learning process. This information collected by teachers is processed in order to individualize the most efficient methodologies in training for English language proficiency, which represents a very important advantage in ensuring success in this process. Therefore, it is important to know what is the impact generated by the study of Artificial Intelligence based on teaching methodologies for training in a second language, in this case English, recognizing the importance of handling that language in a globalized world. It is expected with the execution of this research work, to know the details regarding the volume of publications registered in Scopus regarding the study of the subject raised above, within which it is expected to identify the year in which it has mostly been published in this regard, which have been the countries globally that have developed more research projects related to the use of technological tools in the teaching of English in the university students, as well as the position of different authors in the face of the latent reality in the new demands that come from each see more diverse needs within the student community.

2. GENERAL OBJECTIVE

Analyze from a bibliometric approach, the characteristics in the volume of scientific production related to the variables English Teaching, Higher Education and Artificial Intelligence, registered in Scopus during the period 2017-2022.

3. METHODOLOGY

This article is carried out through a mixed orientation research that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of English Teaching, Higher Education and Artificial Intelligence.

On the other hand, examples of some research works published in the area of study indicated above are analyzed from a qualitative perspective, starting from a bibliographic approach that allows describing the position of different authors against the proposed topic.

It is important to note that the entire search was performed through Scopus, managing to establish the parameters referenced in *Figure 1*.

3.1 Methodological design

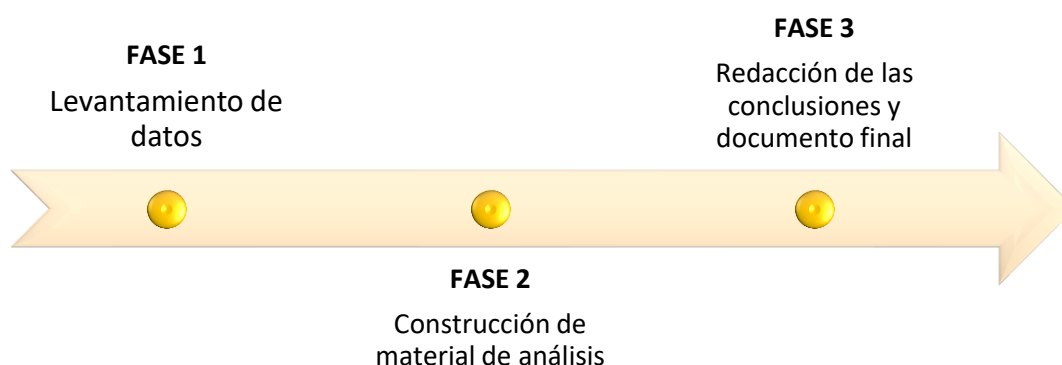


Figure 1. Methodological design

Source: Authors.

3.1.1 Phase 1: Data collection

Data collection was executed from the Search tool on the Scopus website, where 61 publications were obtained from the choice of the following filters:

- TITLE-ABS-KEY (teaching AND english, AND artificial AND intelligence, AND higher AND education) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017))
- Published documents whose study variables are related to the study of English Teaching, Higher Education and Artificial Intelligence.
- Works published in journals indexed in Scopus during the period 2017-2022.
- No distinction by country of origin
- Without distinction in areas of knowledge.

➤ Regardless of type of publication.

3.1.2 Phase 2: Construction of analysis material

The information collected in Scopus during the previous phase is organized and subsequently classified by graphs, figures and tables as follows:

- Co-occurrence of Words.
- Year of publication.
- Country of origin of the publication.
- Area of knowledge.
- Type of Publication.

3.1.3 Phase 3: Drafting of conclusions and outcome document

In this phase, we proceed with the analysis of the results previously yielded resulting in the determination of conclusions and, consequently, the obtaining of the final document.

4. RESULTS

4.1 Co-occurrence of words

Figure 2 shows the co-occurrence of keywords found in the publications identified in the Scopus database.

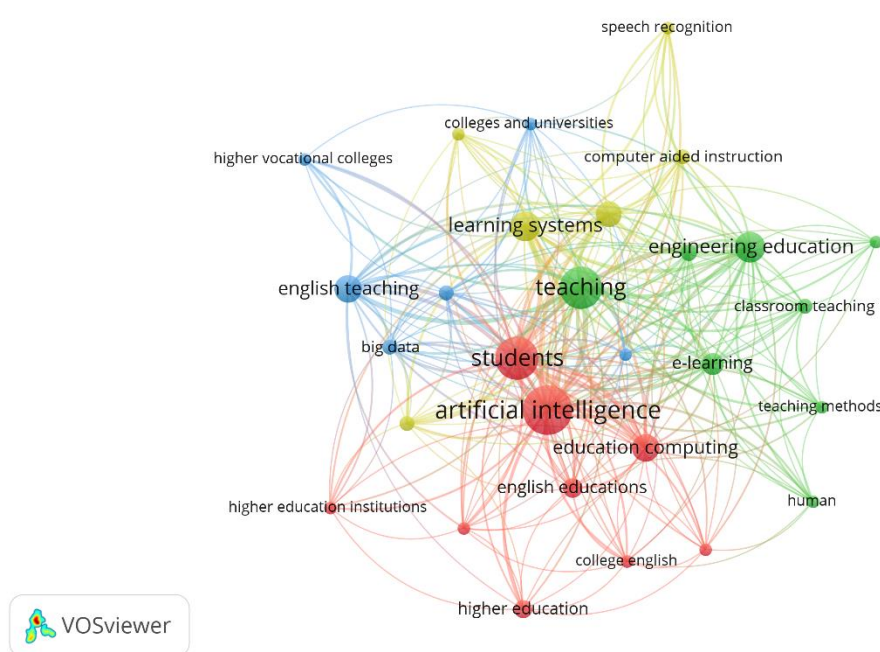


Figure 2. Co-occurrence of words

Source: Own elaboration (2023); based on data exported from Scopus.

Students, Artificial Intelligence, and Education in English, make up the three keywords with the greatest influence within the main group of research identified with the color red in Figure 2, directly related to publications that analyze the variables Higher Education Institutions and English Schools, so it is expected that the

publications identified through the execution of Phase 1 of the methodological design proposed for the development of this document, delve into the strategies that are implemented in the process of teaching a second language, based on the use of ICT and advances in Artificial Intelligence that every day represent new and better tools to ensure a successful learning of English. Teaching also represents one of the keywords most used in the publications analyzed in this article, associated with variables such as E-learning, Teaching Methods, Teaching in the Classroom, which combine the different methodologies, in the application of didactic material from the technological tools manifested in the publications based on Learning Systems, Computer-Assisted Instruction. It draws attention, the keyword Big Data, which feeds with a high volume of information, the systems that are dedicated to support the teaching of a second language, being able to process such data, in order to offer a personalized experience in the learning processes, individualizing the needs of each student through the interpretation of the most effective methodologies for each case.

4.2 Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year of publication.

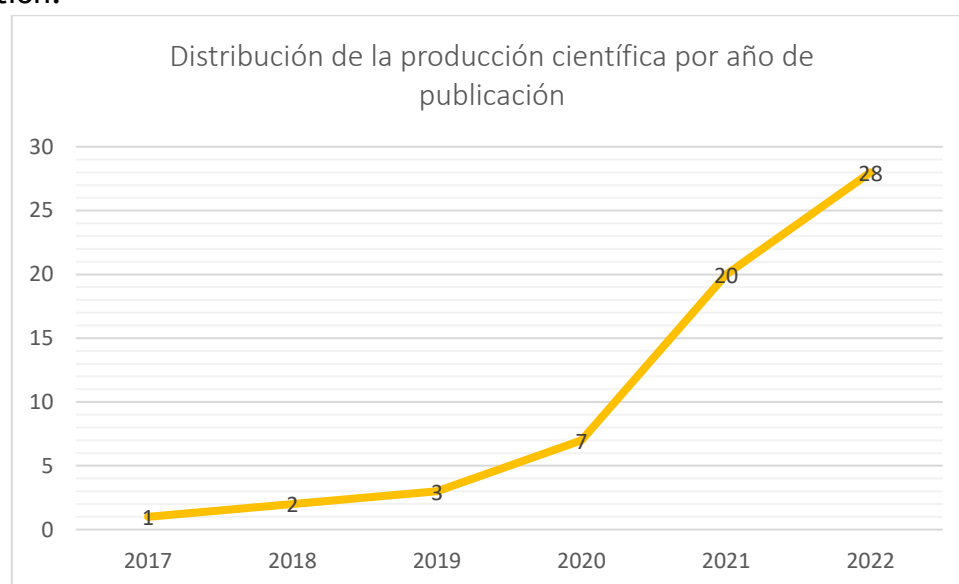


Figure 3. *Distribution of scientific production by year of publication.*

Source: Own elaboration (2023); based on data exported from Scopus

During the year 2022, a total of 28 scientific documents were published through high impact journals indexed in the Scopus database which are closely related to the study of teaching techniques in English language learning in higher education students, based on the contributions of Artificial Intelligence, as proposed in the article entitled "Design of a Path Analysis System for the Implementation of Online English Education based on SVM+LDA" (Niu, 2022) whose purpose was to design a system for the analysis of the implementation path of online English education, understanding that globalization itself has allowed the offers of educational

institutions to diversify their strategies, As shown in the teaching of English based on the use of technological tools the management of big data, cloud computing and artificial intelligence. According to its authors, the demand in China has grown vertiginously due to the awakening of a collective interest in handling a second or third language, in this case English, so the users of digital platforms for this purpose, has increased significantly in recent years. Within the data analyzed necessarily to fulfill their objective, the authors analyze the English learning behavior and the state of use of users of online English education, based on the model of confirmation of expectations, combined with the model of success of the information system and the theory of the relationship with the client, Build a conceptual model of the behavior of continuous use of users of online English education, concluding that such a system has some viability in terms of the academic training of Chinese students in the training of the second language.

4.3 Distribution of scientific production by country of origin.

Figure 4 shows how scientific production is distributed according to the nationality of the authors.

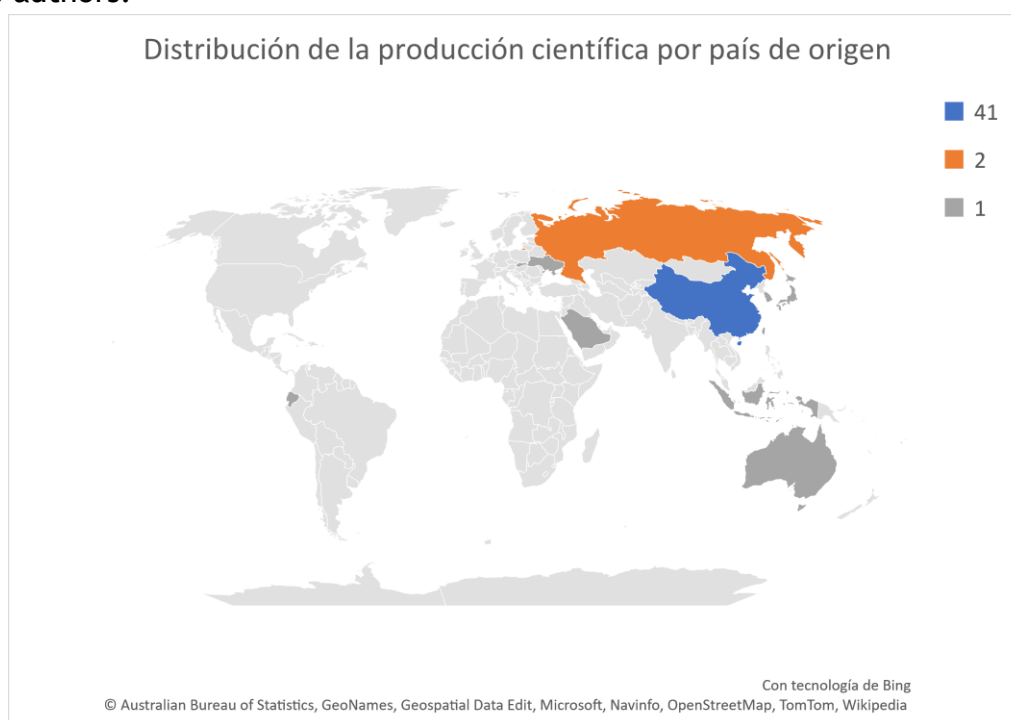


Figure 4. Distribution of scientific production by country of origin.

Source: Own elaboration (2023); based on data provided by Scopus.

China widely leads the research around English language teaching techniques applied to university students based on the usefulness of Artificial Intelligence, with a total of 41 publications in journals indexed in Scopus during the period 2017-2022. Only one Latin American country has presented scientific production around the topic mentioned above, Ecuador with a publication entitled "The impact of virtual platforms in the field of the knowledge and information society as a learning

resource" (Gonzalez-Carrión, Muñoz-Vallejo, & Sánchez-Landín, 2020) whose objective was to determine the impact of the Kahoot educational platform on students of the Institute of Languages of the National University of Loja (UNL) and how its application has improved student development. It should be noted that this methodology applied in the teaching-learning process is lowered in the game where theoretical-practical knowledge is applied in a playful environment for the student community, thus allowing to get out a little of the "mold" of traditional teaching taking advantage of the tools offered today by ICT, so that the learning of both the English language and other areas of knowledge, become more dynamic and arouse greater interest in students. Therefore, the authors recognize the Kahoot resource as a learning tool that captures the attention of students to learn by playing in a higher education context.

4.4 Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.

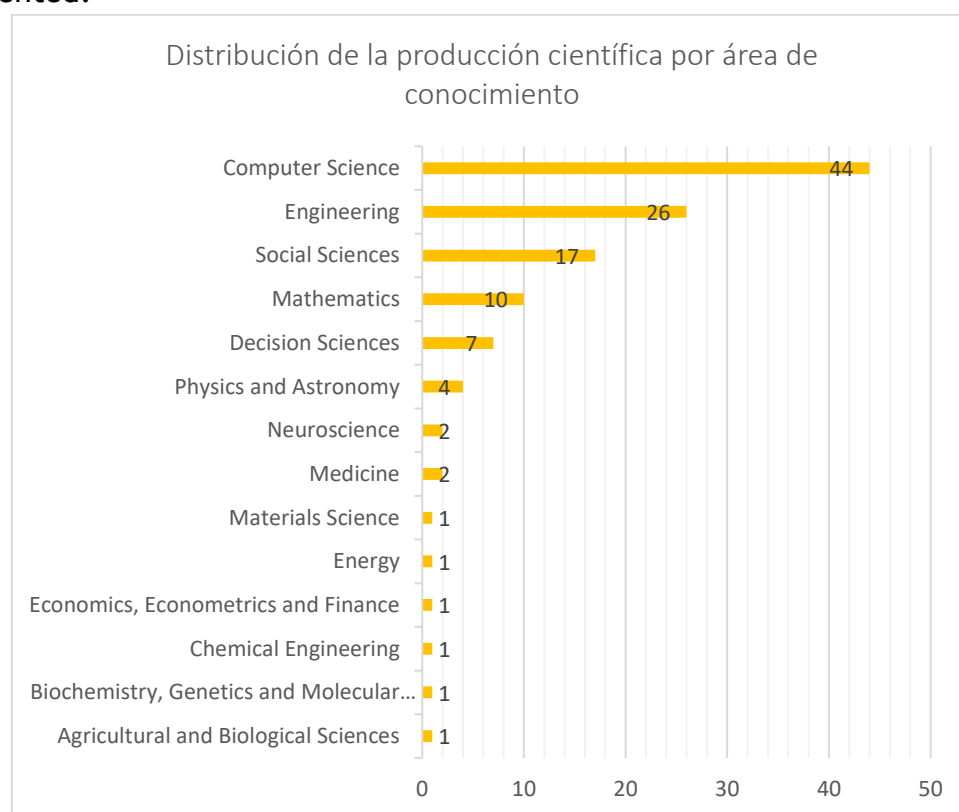


Figure 5. Distribution of scientific production by area of knowledge.

Source: Own elaboration (2023); based on data provided by Scopus.

Computer Science was the area of knowledge with the greatest influence in the execution of research projects related to the study of teaching and learning techniques of the English language in higher education downloaded in tools provided by Artificial Intelligence, a total of 44 documents included within their

methodologies, the study from a technological perspective as shown in the article "The model architecture of AI technology in the teaching of higher professional English in the classroom" (Liu, Gong, & Liu, 2022) whose objective was to analyze mainly the establishment of an artificial intelligence technology system model in the teaching of English in higher vocational training classrooms. The authors identify a series of problems in the processing of data that feeds the information systems that make up the technological applications based on Artificial Intelligence, especially those that analyze the behavior of students within virtual platforms, for which the authors propose solutions to these drawbacks recognition of the importance of the development of the different teaching methodologies based on resources currently offered by technological advances in terms of education. The successful integration of English language teaching with the technological proposals currently offered to strengthen the generation of new knowledge is sought.

4.5 Type of publication

In the following graph, you will observe the distribution of the bibliographic finding according to the type of publication made by each of the authors found in Scopus.

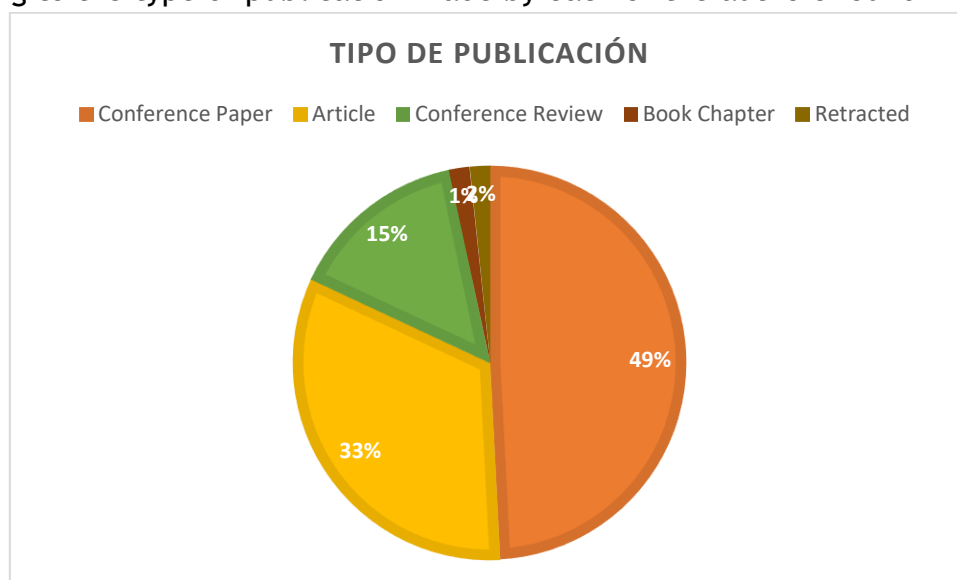


Figure 6. Type of publication.

Source: Own elaboration (2023); based on data provided by Scopus.

The Type of Publication most frequently used by the authors identified through the search executed on the Scopus database under the criteria registered in the methodology proposed for the development of this document, define the Conference Articles, as the most frequent methodology in terms of publications, with a percentage of 49% compared to 33% of Journal Articles. In third place, Conference Reviews with 15% and Book Chapters with 1%. From this last category stands out the document entitled "Perspectives of the teaching of English in higher education institutions in a digitalized educational process" (Kovalev, 2021) whose objective was to analyze the latest trends in the digitalization and computerization of education today, which contribute to the general process of introduction of



modern technologies in education, as a process of stable global trend, which implies an improvement in the contents, forms and approaches of learning. Therefore, the authors manage to establish the important contribution that digital media exert on the academic training and execution of teaching strategies within the preparation of students in higher education, which, through online learning, manage to detach their process of acquiring knowledge through traditional methods, taking advantage of the multiple advantages offered by ICT today.

CONCLUSIONS

Thanks to the bibliometric analysis applied to the search results in the Scopus database, where the works published in high-impact journals related to the study of English Language Teaching and Learning Techniques in higher education students during the period 2017-2022 are contemplated, it was obtained that China was the country with the highest number of records in said platform with a total of 41 published documents, being the leading country in research related to the topic mentioned above, followed by Russia with only two publications. Ecuador was the only Latin American country present on the list with a document that explains the importance of the application of digital strategies in the training of university students in search of the necessary tools to have the mastery of a second language, in this case, English. On the other hand, the area of knowledge with the greatest influence in the execution of the different research methodologies carried out by the authors related here, correspond to those derived from Computer Science, thus explaining the nature of the variables intervened, which led the line of research related to innovation, Information and Communication Technologies (ICT), Artificial Intelligence and BigData analysis as one of the most important and determining sources of information when feeding educational systems with the behavior of students within the educational applications designed with the purpose of supporting face-to-face methodologies in higher education. It has been determined that the type of publication most frequently used within the scientific community referenced in this document was the Conference Article, which represented 49% of the total publications identified for further analysis. From the above it was possible to infer that the conferences related to the treatment of the Teaching and Learning Techniques of the English Language in students of higher education, resulted in 30 of the 61 publications were carried out thanks to the presentation of the research findings in these academic spaces. From the above, it is worth noting that the authors agree on the importance of integrating face-to-face and virtual models in the teaching of English, in order to expand educational coverage and of course target all the needs of students by providing the necessary tools for their efficient performance in the labor market. Finally, it is vital to recognize the contribution of reviews such as the one presented in the document, since from these results it is expected to encourage the scientific community to generate new knowledge around the use of Artificial Intelligence as a strategy in the process of learning a second



language in university students and the generation of awareness as to what it implies for work performance, Have the command of the English language today.

REFERENCES

- [1] Gonzalez-Carrión, E. L., Muñoz-Vallejo, M. L., & Sánchez-Landín, J. H. (2020). The impact of virtual platforms in the field of the knowledge and information society as a learning resource. *CEUR Workshop Proceedings: ICAI Workshops, ICAIW 2020 - 1st International Workshop on Applied Artificial Intelligence, WAAI 2020*, (págs. 87-98).
- [2] Kovalev, M. N. (2021). Prospects for Teaching English at Higher Education Institutions in a Digitalized Educational Process. En E. G. Popkova, V. N. Ostrovskaya, & A. V. Bogoviz, *Socio-economic Systems: Paradigms for the Future* (págs. 1201-1209). Springer Nature Switzerland AG.
- [3] Liu, X., Gong, Y., & Liu, L. (2022). The Model Architecture of AI Technology in Higher Vocational English Classroom Teaching. *Proceedings - 2022 3rd International Conference on Education, Knowledge and Information Management, ICEKIM 2022* Pages 239 - 242 2022 3rd International Conference on Education, Knowledge and Information Management, ICEKIM 2022 Virtual, Online 21 January 2022th, (págs. 239-242).
- [4] Niu, X. (2022). Design of Online English Education Implementation Path Analysis System based on SVM+LDA. *2nd IEEE International Conference on Advanced Technologies in Intelligent Control, Environment, Computing and Communication Engineering, ICATIECE 2022*. Bnagalore: IEEE.
- [5] Ban, H., & Ning, J. (2021). Online english teaching based on artificial intelligence internet technology embedded system. *Mobile Information Systems*, 2021 doi:10.1155/2021/2593656
- [6] Chen, P. (2022). Design and construction of an interactive intelligent learning system for english learners in higher education institutions. *Advances in Multimedia*, 2022 doi:10.1155/2022/6364796
- [7] Chen, Y., & Chen, Z. (2022). Effectiveness of artificial intelligence multimedia courseware in classroom teaching application. *Applied Bionics and Biomechanics*, 2022 doi:10.1155/2022/4543875
- [8] Cui, L. (2021). A study on the construction of wisdom classroom for oral english course in higher vocational college based on big data and artificial intelligence. Paper presented at the *Proceedings - 2021 2nd International Conference on Big Data and Informatization Education, ICBDE 2021*, 253-256. doi:10.1109/ICBDIE52740.2021.00063 Retrieved from www.scopus.com
- [9] Cui, Y. (2021). Research on the design of lexical-chunks centered mode of writing under artificial intelligence in college english course. Paper presented at the *Proceedings - 2021 2nd International Conference on Big Data and Informatization Education, ICBDE 2021*, 402-405. doi:10.1109/ICBDIE52740.2021.00097 Retrieved from www.scopus.com



- [10] Geng, L. (2021). Evaluation model of college english multimedia teaching effect based on deep convolutional neural networks. *Mobile Information Systems*, 2021 doi:10.1155/2021/1874584
- [11] Gonzalez-Carrión, E. L., Muñoz-Vallejo, M. L., & Sánchez-Landín, J. H. (2020). The impact of virtual platforms in the field of the knowledge and information society as a learning resource. Paper presented at the CEUR Workshop Proceedings, , 2714 87-98. Retrieved from www.scopus.com
- [12] Hu, B. (2021). English listening teaching model in flipped classroom based on artificial intelligence fusion control algorithm. *Mathematical Problems in Engineering*, 2021 doi:10.1155/2021/6005359
- [13] Hurajová, L. (2021). Can close cooperation between esp/clil experts and disciplinary teachers in higher education lead to fostering english education environment. *Journal of Teaching English for Specific and Academic Purposes*, 9(1), 129-136. doi:10.22190/JTESAP2101129H
- [14] Jiang, Y. (2022). Artificial intelligence technology for python test simulation of oral english teaching evaluation. Paper presented at the 6th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud), I-SMAC 2022 - Proceedings, 654-657. doi:10.1109/I-SMAC55078.2022.9987280 Retrieved from www.scopus.com
- [15] Jin, Y. (2022). Sentiment analysis in british and american literature teaching under formative assessment and machine learning. *Wireless Communications and Mobile Computing*, 2022 doi:10.1155/2022/7954166
- [16] Kovalev, M. N. (2021). Prospects for teaching english at higher education institutions in a digitalized educational process doi:10.1007/978-3-030-56433-9_126 Retrieved from www.scopus.com
- [17] Kudryavtseva, V., Barsuk, S., & Frolova, O. (2021). ACTIVE LEARNING STRATEGIES IN MARITIME ENGLISH TRAINING. Paper presented at the 21st Annual General Assembly, IAMU AGA 2021 - Proceedings of the International Association of Maritime Universities ,IAMU Conference, 229-238. Retrieved from www.scopus.com
- [18] Li, N. (2022). Study of interpretation training on the development of foreign-related pharmaceutical enterprises from the perspective of artificial intelligence - taking rising of guangdong-hong kong-macao greater bay area. Paper presented at the Proceedings - 2022 8th Annual International Conference on Network and Information Systems for Computers, ICNISC 2022, 265-268. doi:10.1109/ICNISC57059.2022.00060 Retrieved from www.scopus.com
- [19] Li, R. (2020). Based on the artificial intelligence technology in higher vocational english major students after-school tutoring system design research doi:10.1007/978-3-030-43309-3_80 Retrieved from www.scopus.com
- [20] Li, Y. (2020). Application of artificial intelligence in higher vocational english teaching in the information environment doi:10.1007/978-981-15-5959-4_143 Retrieved from www.scopus.com
- [21] Lin, L. (2021). Investigation and research on the cultivation of students' english interests under artificial intelligence technology. Paper presented at the ACM



International Conference Proceeding Series, 1091-1096.
doi:10.1145/3495018.3495342 Retrieved from www.scopus.com

- [22] Liu, W. (2020). Information feedback analysis of public english teaching in art academies combining the branch vector determinant algorithm. Paper presented at the Journal of Physics: Conference Series, , 1533(2) doi:10.1088/1742-6596/1533/2/022045 Retrieved from www.scopus.com
- [23] Liu, X., Gong, Y., & Liu, L. (2022). The model architecture of AI technology in higher vocational english classroom teaching. Paper presented at the Proceedings - 2022 3rd International Conference on Education, Knowledge and Information Management, ICEKIM 2022, 239-242. doi:10.1109/ICEKIM55072.2022.00060 Retrieved from www.scopus.com
- [24] Liu, X., & Li, N. (2022). Optimization of multimedia english teaching computer-aided system based on internet of things. Computer-Aided Design and Applications, 19(S6), 136-146. doi:10.14733/cadaps.2022.S6.136-146
- [25] Luo, X. (2022). Application of artificial intelligence and virtual reality technology in online course education. Paper presented at the 2022 IEEE International Conference on Advances in Electrical Engineering and Computer Applications, AEECA 2022, 1154-1157. doi:10.1109/AEECA55500.2022.9919025 Retrieved from www.scopus.com
- [26] Ma, Q. (2021). Development of english classroom teaching innovation under the background of artificial intelligence doi:10.1007/978-3-030-74814-2_76 Retrieved from www.scopus.com
- [27] Ma, X. (2022). English teaching in artificial intelligence-based higher vocational education using machine learning techniques for students' feedback analysis and course selection recommendation. Journal of Universal Computer Science, 28(9), 898-915. doi:10.3897/jucs.94160
- [28] Miller, A. L. (2018). Video editing stepping stones: Using podcasts and music videos to introduce editing techniques to film studies students. Paper presented at the ACM International Conference Proceeding Series, 436-440. doi:10.1145/3297156.3297253 Retrieved from www.scopus.com
- [29] Murzo, Y., Chuvileva, N., & Schetinina, A. (2022). Using semantic patterns in web search and assessment of professionally oriented texts in a foreign language for training students in higher education institutions of mineral resource profile. International Journal of Emerging Technologies in Learning, 17(5), 238-251. doi:10.3991/ijet.v17i05.28231
- [30] Niu, X. (2022). Design of online english education implementation path analysis system based on SVM+LDA. Paper presented at the 2nd IEEE International Conference on Advanced Technologies in Intelligent Control, Environment, Computing and Communication Engineering, ICATIECE 2022, doi:10.1109/ICATIECE56365.2022.10046839 Retrieved from www.scopus.com
- [31] Qin, J. (2020). Innovation and development of english higher education in the era of "Internet +" doi:10.1007/978-981-15-5959-4_163 Retrieved from www.scopus.com
- [32] Sharadgah, T. A., & Sa'di, R. A. (2022). A SYSTEMATIC REVIEW OF RESEARCH ON THE USE OF ARTIFICIAL INTELLIGENCE IN ENGLISH LANGUAGE TEACHING AND LEARNING



- (2015-2021): WHAT ARE THE CURRENT EFFECTS? *Journal of Information Technology Education: Research*, 21, 337-377. doi:10.28945/4999
- [33] Shi, J., Ni, L., & Su, Z. (2022). English-speaking teaching system with natural language processing technology based on artificial intelligence algorithms. Paper presented at the 2022 10th International Conference on Information and Education Technology, ICIET 2022, 53-57. doi:10.1109/ICIET55102.2022.9779015 Retrieved from www.scopus.com
- [34] Shin, M. -. (2018). How to use artificial intelligence in the english language learning classroom. *Indian Journal of Public Health Research and Development*, 9(9), 557-561. doi:10.5958/0976-5506.2018.01058.6
- [35] Shu, X., & Xu, C. (2022). Artificial intelligence-based english self-learning effect evaluation and adaptive influencing factors analysis. *Mathematical Problems in Engineering*, 2022 doi:10.1155/2022/2776823
- [36] Su, Z., Liu, M., Song, B., & Lian, S. (2021). The intervention of internet technology on students' english learning in the intelligent era. Paper presented at the ACM International Conference Proceeding Series, 775-780. doi:10.1145/3482632.3483015 Retrieved from www.scopus.com
- [37] Su, Z., Miao, L., & Man, J. (2019). Artificial intelligence promotes the evolution of english writing evaluation model. Paper presented at the IOP Conference Series: Materials Science and Engineering, , 646(1) doi:10.1088/1757-899X/646/1/012029 Retrieved from www.scopus.com
- [38] Sun, W. (2021). The status quo of information technology-based english informatization education in colleges and universities. Paper presented at the ACM International Conference Proceeding Series, 1038-1042. doi:10.1145/3482632.3483078 Retrieved from www.scopus.com
- [39] Taskiran, A., & Goksel, N. (2022). AUTOMATED FEEDBACK AND TEACHER FEEDBACK: WRITING ACHIEVEMENT IN LEARNING ENGLISH AS A FOREIGN LANGUAGE AT A DISTANCE. *Turkish Online Journal of Distance Education*, 23, 120-139. doi:10.17718/tojde.1096260
- [40] Tsai, P. -. , Chen, B. -. , Chou, S. -. , & Chang, L. -. (2022). Technology assisted device for bilingual learning environment in higher education in taiwan. Paper presented at the 5th IEEE Eurasian Conference on Educational Innovation 2022, ECEI 2022, 274-277. doi:10.1109/ECEI53102.2022.9829503 Retrieved from www.scopus.com
- [41] Wang, G. (2022). Applicability of team-based learning with non-english major first year chinese students in an english-for-academic-purposes (EAP) course. Paper presented at the ACM International Conference Proceeding Series, 109-114. doi:10.1145/3535756.3535774 Retrieved from www.scopus.com
- [42] Wang, L., Bian, W., Fu, Y., Li, Y., Ming, J., & Zhao, C. (2022). Online intelligent classroom teaching innovation of pharmacy based on artificial intelligence technology doi:10.1007/978-981-19-4775-9_148 Retrieved from www.scopus.com
- [43] Wang, X. (2022). Computer-aided college english teaching system based on virtual reality and artificial intelligence. *Wireless Communications and Mobile Computing*, 2022 doi:10.1155/2022/9613587



- [44] Wiannastiti, M., Oktriono, K., & Simatupang, M. S. (2019). Digital literacy of ELT lecturers in different contexts: A case at two universities in jakarta. Paper presented at the ACM International Conference Proceeding Series, 515-519. doi:10.1145/3377713.3377805 Retrieved from www.scopus.com
- [45] Wu, L. (2022). Case study on application of artificial intelligence to oral english teaching in vocational colleges. Paper presented at the Proceedings of the International Conference on Computation, Big-Data and Engineering 2022, ICCBE 2022, 71-74. doi:10.1109/ICCBE56101.2022.9888213 Retrieved from www.scopus.com
- [46] Wu, X. (2021). Application of artificial intelligence in higher vocational english teaching mode. Paper presented at the Journal of Physics: Conference Series, , 1852(2) doi:10.1088/1742-6596/1852/2/022089 Retrieved from www.scopus.com
- [47] Xiao, C. (2017). English assistant teaching system of higher vocational education based on expert system. Agro Food Industry Hi-Tech, 28(3), 2357-2360. Retrieved from www.scopus.com
- [48] Xie, H. (2022). Recommendation of english reading in vocational colleges using linear regression training model. Mobile Information Systems, 2022 doi:10.1155/2022/6786111