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Artificial Intelligence Applications for Enhancing Intercultural Communicative Competence in ESP

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Abstract:

In the last decade, more applications beneficial to both learners and teachers have emerged, and AI, for instance, has influenced the ELT field dramatically. The integration of AI tools has started to be widely used in language teaching, which has raised much interest among many researchers who are trying to explain the pedagogical implications of such integration in language classrooms. ESP as a branch of ELT is not an exception to this trend. The current research work centres on the problem of restructuring the ESP learning process in terms of ICC around new AI tools, which assist in achieving greater inclusion, diversity and accessibility. To do so, a descriptive and analytical approach has been adopted, one that integrates a systematic review of contemporary empirical and design-based studies concentrating on AI interventions encountered in the ESP context with the thematic analysis of pedagogical designs and the outcomes documented in the studies. From the analysis, it is evident that chatbots, adaptive platforms, and other AI tools are being utilised to improve learner engagement, offer personalised adaptive feedback to support learners at different levels, and address inclusion and accessibility gaps. However, there are challenges including insufficient AI competency among educators, ethical and data privacy issues, cultural bias of AI, and the possibility of being overly dependent on AI and other tools as part of the pedagogy, which may result in a fragmented approach to instruction.

***Dr. Merine Asma**

Introduction

Although often characterised as a modern concept, Artificial Intelligence is a phenomenon that has been around for quite some time now. The development of this particular phenomenon is usually attributed to what is referred to as the Dartmouth Conference, a meeting where John McCarthy, along with others, first articulated the term Artificial Intelligence. This meeting, which took place in 1955, has been considered the unofficial birthplace of the field of study now referred to as AI. In the realm of academia, McCarthy provided a definition of artificial intelligence that identifies the field with the creation of intelligent automated machines. He and his associates contended that machines could and should be able to duplicate any aspect of learning and/or intelligence. Accordingly, the goal is to create computers that can communicate, perform logical reasoning, solve problems that are thought to be within the domain of human intelligence, and improve themselves (McCarthy et al, 2006). This definition highlights the purpose of creating machines capable of carrying out activities that usually require the ability to understand language and the ability to learn.

The influence of AI has manifested itself globally in 2024, as the technology has been integrated in teaching and learning within the educational discipline. Changes in the technology utilised in the classroom have transformed the dynamics of how learning is perceived and the patterns of learning itself. The use of AI technology in teaching, learning and pedagogical literature has become commonplace. This is undoubtedly impacting the field of pedagogy and the teaching of specialised English more specifically. Even though some professionals in the pedagogy and teaching of specialised English have started integrating tools of Artificial Intelligence in their classes, more investigations are warranted in order to ascertain the extent of their usage and what frameworks are needed in order to offer instructors support in practical usage of tools of AI in their classes. Thus, this research explores the ways that AI applications can be integrated into ESP classroom practice as well as their ability to foster Intercultural Communicative Competence. The present study seeks to answer the following research questions:

1) What impact do AI tools have on intercultural communicative competence and student engagement in ESP?

2) What barriers hinder AI integration in ESP and which strategies effectively address them?

1. Methodology

1.1. Research Approach

This study utilised a descriptive-analytical approach because it allows systematic mapping and critical interpretation of data and evidence without having to collect new primary evidence. In particular, this research integrated review and thematic analysis of pedagogy, integrated outcomes and goals of the interdisciplinary studies, and intercultural education designs, which used systematic study of peer-reviewed publications from where appropriate databases were monitored (2014-2024). Specific inclusion criteria focused on classroom-level interventions in ESP contexts (e.g., chatbots, adaptive systems, machine translation, automated assessment, learning analytics). Items, after being selected, were employed in coding by research design, participant profile, technological affordances, instructional implementation, and the effects on the metrics of ICC (intercultural communicative competence) obtained were measured. In this context, data synthesis included both numeric summaries (like summarising the frequency and distribution of types of interventions and the outcomes that were reported), and qualitative thematic synthesis, which was used to detect common benefits, barriers, and patterns in the implementation. In order to increase reliability, coding was verified for consistency and the results were cross-referenced between different types of research. Limitations are acknowledged and considered to some extent to formulate conclusions (primarily the dependence on published research, methodological variance, and potential publication bias). This engaging analytic strategy allows for making empirically based recommendations regarding curriculum design for specific purposes, researcher development, and future development for the training of teachers.

1.2. Scope and Limitations

This study offers a thorough account of contemporary empirical and design-based research and thematically synthesises and reviews the pedagogical applications of artificial intelligence tools in the context of ESP in the higher education sector, with an emphasis on the tools' potential to enhance ICC. Furthermore, this study concentrates on various technological interventions applied in classrooms, including chatbots, adaptive learning platforms, translation applications, automated grading tools, and learning analytics, and assesses their effects on student engagement, feedback personalisation, and accessibility and inclusion. However, the review is strictly analytical and descriptive in nature and is unable to establish any interventional effects or primary empirical evidence in regard to learning gains. Further, the review is limited in its conclusions due to the diversity that characterises the evidence base (differing methodological approaches, sample sizes, outcome measures and lengths of interventions) and the constraints of the original literature due to selective reporting and publication bias.

Also, the rapid advancements in technology, especially in AI, as well as the inconsistent geographic and language representation in the existing literature, pose constraints on the applicability and sustainability of some of the findings, as well as the ethical, legal, and infrastructural discrepancies of the jurisdictions, which means that the recommendations need to be adapted. Ultimately, this study has to rely upon what the authors report in their outcomes, thus incorporating some of the methodological weaknesses of their original studies. To minimise these weaknesses as much as possible, the review employs clear, explicit inclusion criteria, considers the quality of the studies, and outlines their primary focus areas to inform subsequent empirical (longitudinal, intervention) studies and local pilot assessments.

2. Literature Review

2.1 ESP Interpretations

There has been a notable change in English language teaching, as culture is no longer confined to literacy studies, but is increasingly shifted to a more practical, needs-based approach in designing curricula for learners' workplace or academic goals. This type of provision — English for Specific Purposes — is used when proficiency in English is a practical requirement for carrying out certain professional or disciplinary activities. In this sense, ESP reconceptualises the design of the course around defined communicative goals, and its proliferation across academic and occupational settings is a function of increasing need for specific, goal-oriented, task-based language instruction (Hutchinson and Waters, 1987 & Strevens, 1977).

Consequently, the central focus of ESP is to meet the learners' specific language needs rather than adhere to a generic syllabus. Beginning in the 1960s, the development of ESP started as a result of an international diffusion of science, technology and trade. ESP developed unique theoretical and methodological aspects, including a focus on the analysis of need, the specificity of situations, and outcomes that are interconnected to the performance of a given workplace or education (Harmer, 1983). Recent conceptualisations emphasise a focus not only on learner-centredness and the relevance of particular genre(s)/context(s) (Dudley-Evans and St. John, 1998) but also on the fact that ESP serves as an approach that brings the teaching of language into congruence with the specific language communication practices of particular social and occupational contexts.

Given the rapid growth of ESP, there is a need to recruit experienced trainers and start specific implementations. There are three elements of ESP and this is where scholars should focus on. Initially, it is essential to segment and analyse ESP programmes based on their variety so that appropriate programmes can be designed and developed to cater to learner needs most effectively. Next, the nature of scientific English requires multifaceted investigation. Finally, the

scientific principles of ESP must include the definition of communicative purposes as fundamental.

2.2 Intercultural Communicative Competence (ICC)

The term intercultural communicative competence describes the abilities to communicate effectively and to respond appropriately to various situations across cultures by integrating one's attitude, knowledge, skills, and critical consciousness. Pillars of the theory view ICC as multifaceted, as Byram (1997) proposes five '*savoirs*' which include attitudes (savoir être), knowledge (savoir), interpreting and relating skills (savoir comprendre), discovery and interaction skills (savoir apprendre/faire), and critical cultural awareness (savoir s'engager). These components work together to allow for fruitful exchanges between different cultures. A further aspect that can be added to Deardorff's process model is that respect and openness (attitudes) and knowledge and skills are the contributing factors that lead to internal outcomes (adaptability, empathy, and flexibility) and attitudes (behaviour and communication) that are externally visible, and thus the outcome is the result of internal processes (Deardorff, 2006).

Kramsch (1993) expands upon the notion of ICC with respect to the discursive and identity-forming aspects of language learning and posits that the intercultural competence that learners ought to have implies the ability to 'reshape cultural meanings'. Actually, theoretical constructions have implications for pedagogy and assessment in the field of ESP teaching. For pedagogy, tasks of ICC-oriented ESP, for example, should go beyond vocabulary and grammar. It should include activities that promote perspective-taking, tasks that examine and compare different genres, and authentic discourse that foregrounds the cultural practices of the discipline. This would operationalise Byram's savoirs and the attitudinal and skills components of Deardorff on discipline-specific tasks. According to Fantini (2021), an interdisciplinary approach to evaluating intercultural competencies involves incorporating performance-based measures (such as task rubrics, role play scenarios, portfolios, etc.), reflective self-assessments (such as journaling), and interaction ratings by external evaluators to create an assessment that is comprehensive. In combination, these perspectives motivate ESP curricula to include the linguistic, pragmatic, and cultural aspects necessary to meet the educational goals of the discipline while also achieving the intercultural competencies needed for global workplace communication.

2.3 AI Technologies in Learning and Teaching Languages

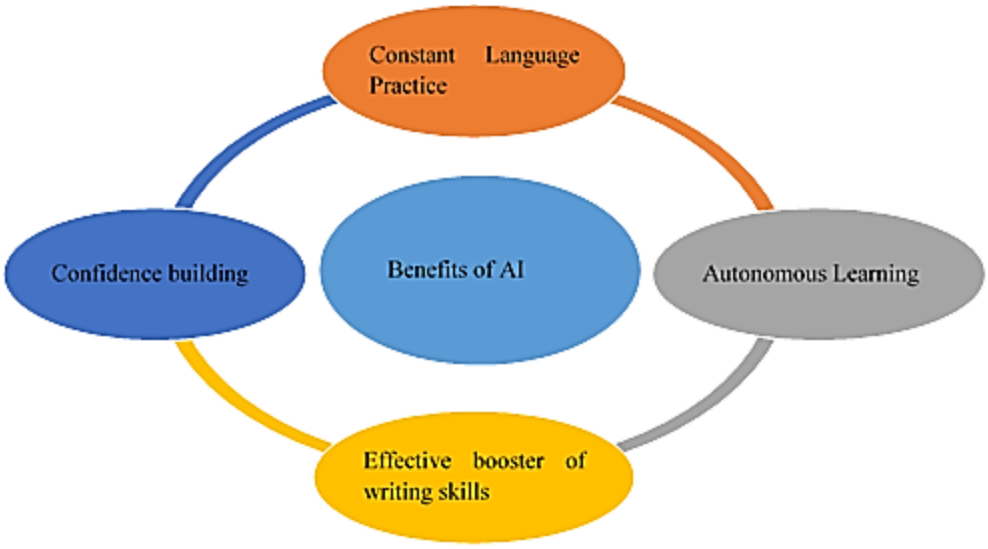
Seo et al. (2021) believe that AI adoption in education is not a new trend but rather an old one, although the applications of AI have been growing fast in the past years. There are three areas where AI in education could have absorbing effects, especially adaptive learning, evaluation, and the acquisition of soft skills such as intercultural communication. In addition, the AI platforms help users in

acquiring language and cultural content by improving their language competencies and context setting (Korte et al., 2024). Here is a short overview of some AI tools and their use:

- To create engaging and effective language learning experiences that increase learners' motivation and improve retention of the material, the following language learning AI applications can be used namely: Rosetta Stone, Duolingo, and Babbel.
- Concerning speaking and pronunciation practice, advanced AI tools such as FLOW Speak, ELSA Speak and Speechace help learners enhance their speaking skills, practice pronunciation and build self-confidence.
- As far as writing skills are concerned, students can use AI tools such as Grammarly and Criterion. These tools provide extensive feedback on learners' writing, correcting their errors (e.g., grammatical, lexical, register, spelling, etc.), and then help students correct them, which proves to be valuable in the writing process specifically as well as the learning process as a whole.
- In terms of translating tools, learners have greatly benefited from services powered by AI, such as DeepL, which translate texts or help them comprehend complex ideas. These services have improved tremendously over the past few years. In addition, they can also broaden learners' vocabulary by offering multiple word options in their translations.
- For real-time assistance and interactive practice, AI tools such as chatbots and virtual tutors allow students to talk to them anytime and from any place. This makes it possible to do role-plays, initiate conversations, and give feedback instantly on vocabulary, grammar, pronunciation, etc. Chatbots and virtual tutors go beyond the borders of the classroom and offer unlimited practice and assistance.
- For personalized learning procedures, programs that AI drives can easily target specific learning objectives for learners. They have sophisticated tools that either generalize or specialize in constructing activities and feedback based on previous performances and patterns of learning. The presence of customization at this level renders the learners the freedom to determine their learning goals, the manner in which they will learn, the time they will take for the different forms of learning and even the skills that they desperately need to master. AI tools have also shown considerable support to teachers as well.
- Concerning generating educational content, AI assists educators in producing various and tailored educational materials. Tools such as Wordwall, Quillionz and Leraning Apps employ AI to generate quizzes and text comprehension exercises tailored to the input, thus providing a greater

variety of exercises, saving teachers time and increasing learners' motivation and interest through features like gamification.

Figure 01: Benefits of AI



Source: Adopted from Amonova et al (2023)

Sinkus and Ozola (2024) declare that AI tools have enormous potential in education and language learning. The following lines summarize the major advantages for language students:

- The innovative, engaging, and interactive characteristics of AI tools, specifically in language acquisition
- Collaborative learning settings and customized interactions designed according to the specific requirements of students,
- The personalized feedback system and the correct pronunciation recognition tool complement the instant speech evaluation feature. This kind of support provides learners with a means to work on their fluency, which in turn fosters better oral skills.
- Having a positive perspective on language acquisition resulted in student's motivation to put in more effort in learning the English language due to the interesting and fun activities.
- Making it possible to enhance language proficiency through substantial practice outside the classroom.
- Evaluation techniques that are both precise and effective: AI tools can automatically assess the accuracy of grammar, vocabulary, and coherence in learner's writing and provide immediate feedback.

2.3.1 Why Use AI?

Research and practice suggest that if AI tools are appropriately implemented, they can contribute significantly to the following:

2.3.1.1 Enhancing Learning through Experiential Methods

With the incorporation of AI tools, learners will be able to engage with vast amounts of human experience by interacting in an individualized manner with tools that intelligently modify their use. This empowers the learners to conduct their research and they become researchers rather than receivers of the knowledge. Using these tools offers immediate feedback to learners, whether through simulations, virtual environments, or interactive activities. Additionally, AI can provide corrections and suggestions, helping learners improve their skills.

2.3.1.2 Achieving Academic Success

AI tools instruction provides constructive means for students to enhance their language skills, particularly by improving their learning attitude, developing self-instruction techniques and increasing self-confidence.

2.3.1.3 Personalized Education

AI tools can evaluate personal learning styles and preferences in order to develop custom learning paths for students. They can also assess the efficiency of the adoption of particular strategies for personalized learning and alter them over time to improve the implementation of the learning process.

2.3.1.4 Embracing Diversity in Sources

While learners have the option of using textbooks, they are also provided with an opportunity to break free from the framework and explore numerous sources of information. Consequently, multiculturalism is addressed in their education because in modern education there is a demand for interdisciplinary integration. Thanks to AI tools, this is possible.

2.4 The Role of Intercultural Communicative Competence in Contemporary Global Interactions

IC takes a central role in ESP as it prepares the learners on how to engage and communicate in various academic and professional settings to engage in cross-cultural interactions successfully. As this type of communication is relevant in many activities, it becomes imperative for students enrolled in ESP programs to understand the complexities of such integration, especially when they have to deal with individuals from diverse cultural backgrounds in different occupational contexts. For instance, in English for Business, cultural awareness is vital during negotiations with foreign business partners so that understanding intercultural communication would help in addressing variations in the ways of communicating, negotiating, or conducting business professionally.

Another example related to English for hotel receptionists is that employees learn how to interact well with multicultural clients from different countries. Such competence is defined as including not only language skills but also cultural sensitivity, empathy, flexibility and the ability to analyze and comprehend culturally bound differences. Thus, effective cross-cultural communication presupposes adequate comprehension of communication, the ability to appreciate cultural differences on a more emotional level, and the usage of such knowledge in practice in real-world situations. Thus, IC skills allow employees to better understand the preferences and expectations of the guests.

Medical translation is also influenced by the culture in which the profession is practised. Cultural context is illustrated by the fact that some medical terms can have meanings that differ from country to country. Consequently, medical translators must consider local culture, or else the terms they attempt to translate may be easily and almost entirely misinterpreted. In academia, researchers often collaborate with scholars from other countries. In this regard, strong skills in intercultural communication allow the flow of information so that academics can cooperate in the undertaking of multidisciplinary projects. In fact, there are other areas in ESP where intercultural communication skills are crucial.

2.5 Applying AI Tools to Advance Intercultural Communication Competence in ESP

As it is discussed previously, the concept of ICC means one can communicate adequately and correctly across various cultures and integrates language skills with other aspects like cultural understanding, empathy, and strategic communicative techniques. Considering the importance of ICC in ESP contexts, the implementation of AI tools should positively impact the mediation of intercultural exchange activities.

An example is McCallum (2024), who says that tasks that simulate scenarios using artificial intelligence allow students to experience a range of cultural situations; therefore, students become more familiar with the practices and norms that are specific to those cultures. While generative AI technology like Google Translate and DeepL are not without their shortcomings when it comes to understanding real-world situations and cultural subtleties, the programmes do enable real-time, cross-linguistic communication and, at the most basic level, ease the ability to communicate with multilingual speakers.

The recent advancement in AI technologies like chatbots has made it possible for learners to engage in scaffolded inter-cultural dialogues. The development of multilingual chatbots, which are programmes designed to digitally imitate human conversations, is also advanced with cultural sensitivity and knowledge. Such systems can provide personal practice activities, deliver formative evaluations on language and pragmatic usage, and facilitate the reflection on and use of various communication strategies. Consequently,

chatbots function as adaptive learning environments which allow users to practise and improve their intercultural competencies within a risk-free context. (Kukulska-Hulme, 2012; Godwin-Jones, 2018).

Both case studies and experts in the field continue to emphasise the advantages and efficiencies in teaching practice. Kohnke (2023) discusses the increasingly widespread adoption of chatbots to help with classroom management and automation of administrative teaching functions to enable teaching staff to engage in more complex levels of teaching design. Chatbots can respond to frequently asked questions, offer personalised feedback and configurable streamlining of the assignment and/or assessment processes. However, many educators like Deardorff (2006) and Godwin-Jones (2018) point out that appropriate incorporation of AI in classroom instruction requires intentional pedagogical design, targeted professional development, and careful consideration of the potential ethical and cultural biases in AI-generated responses.

3. Previous Studies

Various studies have been conducted to investigate the integration of AI in educational settings to enhance intercultural communication competence. Such studies provide insight into the ways in which technology could be harnessed for the design of more inclusive and cross-culturally sensitive educational settings through the examination of various facets of AI integration. These studies make use of experimental or quasi-experimental design, quantitative methods as well as mixed methods, which are some of the best ways in which AI is evaluated in education.

Ismailov (2021) employed quasi-experimental research to compare the effectiveness of the telecollaborative methods that were AI-supported with AI-traditional telecollaborative approaches. The set-up provided some measures of control while investigating the contribution of AI integration on students' performance in communication across cultures. In these situations, the use of AI is valuable because it allows for the evaluation of results based on the different teaching strategies applied by the same teacher. The aim was to promote students' engagement in an inquiry-based learning approach that included the exchange of cultural values and practices with peers who came from different backgrounds. The results found that even though AI tools help in overcoming communication challenges across different cultures, their use raised difficulties in interpreting cultural-specific contexts, which could result in misinterpretations of messages. This limitation emphasizes the need to combine AI integration processes with traditional educational practices in order to have an even wider appreciation of the different cultural contexts.

In her part, Chang (2023) focused on assessing the effectiveness of AI Chatbot instruction in improving the intercultural communicative competence of learners enrolled in a Tourism English course. She exposed two groups of students

to two different approaches: AI chatbot interaction and traditional learning methods. This technique made it easier to focus on the precise goal of the study, which was to figure out the effectiveness of learning with AI and teaching with AI effectiveness measured by the improvement of ICC. In other words, she used AI chatbots to develop a stimulating learning environment where students could practice communicative skills with simulations which imitate real-life interactions and allow students to work on their ICC actively. The findings emphasized the effective use of AI chatbots while improving certain aspects of intercultural communication competence; however, they were also able to note deficiencies in the more complex tasks for which the AI did not offer enough support.

On the other hand, Khasawneh (2023) aimed to study the influence of virtual interaction and translation technologies on students' intercultural communication competence and intercultural sensitivity. This study highlights the diverse and considerable uses of AI and ICT in education, including second language acquisition, cross-cultural perspectives, and other specific areas such as inquiry-based learning. He used AI-based translation technologies in a descriptive study that highlights the involvement of language specialists and professional translators. Such tools were assessed to determine whether or not they assisted in overcoming language and cultural barriers with methods that entailed collecting participant assessment as well as the cultural aspects of the translation process. It was found that although AI tools help to eliminate differences in communication across cultures, they often fail to take into consideration important cultural aspects, which could lead to miscommunication. This limitation shows clearly that the use of AI must be combined with conventional and pedagogical approaches to foster the understanding of more nuanced cultural constructs.

4. Challenges and Limitations of AI in Enhancing ICC

Even though the review emphasizes the positive aspects of AI in improving ICC, it points out some challenges and limitations that need to be addressed as well. One of the major challenges is AI's lack of comprehension and interpretation of cultural nuances. Communication does not only consist of exchanging utterances; instead, it encompasses the use of tone, context, nonverbal behaviours, and culture-specific meanings (Klimova & Chen, 2024, p. 14). Artificial intelligence has its shortcomings, which can easily result in misunderstandings and misinterpretations, for instance, in complex scenarios of communication.

To put it differently, AI can easily translate words into other languages without any problem. However, it sometimes fails to address the exact cultural meaning, i.e. the inability of certain gestures or phrases to maintain their cultural context or meaning. This shows that human support is significant in guaranteeing that AI tools are used appropriately and correctly in cultural contexts. Additionally, the effectiveness of AI in shaping intercultural communication skills relies heavily on the datasets used to build the AI systems. Ideally, suppose

the dataset used to train an AI model is narrow or has certain biases. In that case, the ability of the AI to portray and honour cultural differences may be undermined. In light of the increasing employment of AI in the educational context, attention needs to be paid to the data utilized in such models so as to represent students' cultural diversity accurately. If this is not done, AI tools may end up exacerbating the cultural misunderstanding rather than alleviating it.

5. Ethical Considerations in AI

The use of AI in education, particularly in the context of ICC, is highly debatable, considering the existing controversies and challenges. The current discussion regarding AI in education has narrowed its focus mainly on the promises in this area. On the positive side, AI has considerable capacity to make learning adaptive, automating monotonous activities and delivering feedback as it engages learners with a given material, which leads to a better outcome. Negative sociological aspects of AI use also raise ethical questions. Data privacy, reinforcing cultural biases and dehumanization of education through relocation of communication from face-to-face to remote interaction are some of the personal contingencies.

One of the major ethical issues is the chance of AI perpetuating existing cultural biases because AI systems can be designed without attention to social forms, which lead to cultural insensitivities and misunderstandings. This over-generalization effect can lead to AI systems reinforcing existing stereotypes. In this respect, it poses a serious threat to intercultural communication since it aims to foster understanding and ensure cultural respect and consideration. Thus, to reduce this threat, AI should be trained on inclusive data so it does not diversify ethnocentrism. Last but not least, algorithms should also regularly audit their systems to ensure they are free from stereotypes.

6. Pedagogical Implications

The integration of AI tools into intercultural education necessitates that they are designed in such a way as to reflect the various aspects of a given culture. Consequently, researchers should determine how these tools are capable of portraying various cultures and cultural aspects in order to enhance their effectiveness in promoting intercultural understanding. Additionally, it is necessary for scholars to investigate how these applications facilitate intercultural communication and interactions so as to improve their usage.

Practical recommendations for creating and embedding chatbots in intercultural education involve the utilization of culturally background-relevant authentic materials as well as employing principles for designing culturally appropriate chatbot communication. Further, to successfully apply these applications for cross-cultural education, it is necessary to have a deep understanding of the specific audience and their sociocultural background. Last

but not least, the incorporation of machine learning and natural language processing techniques can also be helpful in providing a more individualized and interesting user experience. Overall, the following recommendations are strongly advised for immediate implementation to mitigate risks and maximise the pedagogical benefits of AI integration in ESP:

- Utilise a combined human and artificial intelligence pedagogical model. Integrate AI-driven task assignments with face-to-face teacher reflection and debriefing to address cultural misunderstandings and maintain contextual integrity (human-in-the-loop).
- Provide continuous professional development training, with a focus on technopragmatic pedagogy, prompt engineering, pedagogical tool evaluation, and culturally relevant teaching so that teachers can instruct effectively to shape AI outputs.
- Utilise artificial intelligence within its task-specific domain. For well-structured simulations, repeatable exercises, formative evaluations, and low-stakes situations, AI is best reserved, while more intricate and highly nuanced cross-cultural activities should be handled with more human supervision.
- Set up procedures to audit data quality and bias. To minimise cultural bias, AI models included in educational materials should undergo representativeness checks, provenance disclosure, and routine bias audits.
- Mandate appropriate ethical and privacy protection mechanisms. Implement organisational protocols regarding (data minimisation and informed consent) and clear communication with users regarding the data retention, processing and deletion practices surrounding student data.
- Establish editorial and validation procedures. Prior to the use of AI-generated content in the classroom (translations, scenarios, and prompts), it is necessary to have linguistic and cultural experts or teachers review and modify the content.
- Create materials intended for teachers and design specific rubrics for evaluation. Construct templates for instructional prompts, create comprehensive task design checklists, and develop analytic rubrics tailored to assessing ICC outcomes and determining when AI-generated responses are suitable or require modifications.
- Conduct preliminary assessments and refine based on findings. To identify potential risks of misinterpretation and improve educational sequence instructions before increasing the programme's scope, use multi-faceted small-scale methodology, qualitative record-keeping, and quantitative assessments.

- Foster interdisciplinary collaboration. Engaging with localisation, tool selection and evaluation with translators, cultural experts and instructional designers.
- Evaluate the preparedness of instructors and students. Assess the staff's and students' technopedagogical competence and digital self-efficacy and facilitate training to address any identified shortcomings.
- Advocate for context-specific studies and documentation. Encourage empirical, transparent studies (such as quasi-experimental, longitudinal, and mixed-methods) that capture contextual elements, so that evidence regarding AI and ICC can be responsibly applied in other contexts.

Conclusion

Courses in ESP are tailored to accommodate the learners' language requirements based on their respective fields of study or areas of profession. Actually, the advent of new artificial intelligence technologies has prompted researchers and language practitioners to consider the integration of these technologies into the pedagogy of ESP once more to address the growing variety of learner needs. This research comprehensively evaluates the potential of AI applications in developing the intercultural communicative competence of students in higher education and provides a summary for educators on Google tools and resources that can be used in in-person, hybrid, and fully online courses. The review shows significant implementation challenges: lack of instructors' preparedness in technopedagogy, ethical and data privacy issues, high-risk culture of AI-generated output bias, and the possible fragmentation of pedagogy caused by the overreliance on tools.

Based on the research questions, the analysis identifies the specific implications of integrating AI into the pedagogy for developing students' cultural awareness and communication flexibility. Consequently, overcoming these challenges calls for action on several fronts: customised training for educators, school zone policies on data and ethics, purposeful instructional design to maintain contextualisation and human mediation, and continuous piloting of AI-supported activities with action research. Furthermore, the results of the studies support the utilisation of AI-informed teaching practices to influence the development of curricula, the design of teacher training programmes, and the formulation of educational policies. Such findings relate to an evidence basis for policy suggestions for curriculum design and implementation in Algerian higher education institutions with regard to artificial intelligence enhanced learning environments and the preparation of students with intercultural skills needed for

success in education and career. All in all, additional empirical studies need to be conducted to better understand the learning outcomes, the most efficient design patterns, and the impacts over time. Longitudinal studies, intervention studies, and the use of evaluations that take context into consideration will be necessary to improve the applications of AI in ESP, moving beyond the phase of 'promising applications' to the phase of large-scale applications that integrate the principles of equity and pedagogy.

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