The Study of Religion and History
Volume 3 issue 1 (2025)
www.srhjournal.com
ISSN(Print): 3006-3329 ISSN(Online): 3006-3337

The Intersection of Artificial Intelligence And Human Language: A Comprehensive Explanation

Unsa Hafiz

Lecturer Department of English Linguistics and Literature, Riphah International University Sahiwal campus, Sahiwal, Pakistan
Email: *unsa.hafiz@riphahsahiwal.edu.pk*

Maria Faheem

Lecturer Department of English Linguistics and Literature Riphah International University Sahiwal campus, Sahiwal, Pakistan
Email: *maria.faheem@riphahsahiwal.edu.pk*

Asad Ali

Department of English University of Sahiwal, Sahiwal, Pakistan
Email: *asaadalee@yahoo.com*

Abstract:

This paper has discussed the interaction of human language and artificial intelligence (AI), the hope and despair of how far advanced computational systems can be introduced into human communications. The study was conducted under the qualitative exploratory research design, which enabled the study to rely on a literature systematic review, case studies of real-life applications, and interviews of experts in the fields of developers, linguists, and ethicists. The findings showed that AI technologies, especially those related to the fields of natural language processing, machine translation, transcription and conversational agents, have made significant milestones and in particular in high-resource languages. The tools are efficient, accurate, and scalable, which is why they can be useful in the educational, healthcare, and business communication fields.

Although such progress made, relevant limitations were also reported in the findings. AI has some trouble with making wise decisions, cultural background and idiomaticity and dialect differences which can be frequently recognized as either mistranslated or culturally insensitive translations. Ethical issues came to the fore, such as reproducing gender and racial inequality, infringing on privacy by collecting so much of their information, and a failure to accommodate under-resourced languages and marginalized cohorts. Experts have stressed that not only do these gaps undermine the overall performance of AI systems, but trust, inclusivity, and fairness in communication as well.

During the discussion, it was emphasized that AI must be offered as the complement of the human expertise and not its substitute. Whereas AI can do repetitive and routine

tasks, it cannot do the same with depth and richness of human meaning-making, empathy, and cultural sensitivity. This is why hybrid models, which is the mixture of AI efficiency and human supervision, were chosen as the ethical and the most effective approach. Its premise is that the future of AI in human language cannot just be one of technical innovation but also through the incorporation of fairness, inclusion and accountability into design and governance mechanisms. Tackling these issues helps AI become a technology that will enhance and not undermine the diversity, dignity, and richness of human communication.

1. Introduction:

Artificial intelligence (AI) has transitioned out of a niche research field and into the thin layer of modern society, which changes the way individuals can retrieve information, communicate and cooperate. The collision of AI and human language is nowhere more clearly transformed than here in our intersection. Developments in Natural Language Processing (NLP), machine translation, automatic speech recognition and conversational agents have extended the domain of human-computer interaction beyond keyword-based instructions to context-sensitive dialogue more reminiscent of human-to-human dialogue. Usages of AI systems (i.e., digital assistants, customer service chatbots, translation engines, and language-learning programs) are illustrative of how AI can be utilized to parse, generate, and evaluate human language at scale. The tools allow transcoding bilinguals or even multiling familization, reducing the price of information access, and again delivering individual support in areas as diverse as education and healthcare, government services, and commerce.

This acceleration can be explained with references to the historical development of NLP. The early rule-based systems suffered inhibitions of ambiguity, idiom and the combinational convolution of natural language. Robustness and coverage were increasingly improved by data-driven methods, first by statistical methods, then by neural networks. Performance on the translation-related tasks like translation, summarization and question answering improved due to the introduction of attention mechanisms and transformer architectures, which allowed models to capture long-range dependencies and more subtle patterns in text. Consequently, current language models are flexible to new tasks and can utilize limited supervision to implement rapid adaptation to the modelling performance and generate fluent text that is contextually acceptable. The progress has led to the possibility of inculcating language comprehension in common solutions, where there is the power of the AI to broker across linguistic and cultural barriers.

The introduction of AI in language-oriented environments, regardless of the apparent benefits in terms of accuracy and utilisation however, presents complicated issues that go beyond the technical side of the performance. The communication system of humans is not the vehicle of the information only, it codes the social conventions and rules, cultural inferences, emotions, power relations, and code of morality. Models that have been trained on large scale corpora take with them the benefits and the weak points of the training data: they can reproduce offensive stereotypes, reinforce existing inequalities, or get wrong culturally specific forms of speech like sarcasm, irony, indirectness. In stakes contextshigh stakes such as mental health triage, legal intake, medical communication thematic context errors are over-rewarded in big ways. Such issues raise the importance of addressing language technologies as socio-technical

infrastructures instead of mere engineering objects, and as such, designed and deployed with due attention.

The advantages of accessibility of AI-powered language technology are, however, also still quite large. Real-time transcription and translation can both accommodate different needs of learners, ensure greater accessibility to pupils with hearing or speech needs as well as international cooperation and workplaces and classrooms. Language-learning applications are able to alter content to the proficiency of the learners, report feedback directly, and tailor practice regimes. In an area where the customers are involved, conversational agents will be involved in triaging ordinary requests, cutting down the length of waiting, having the human staff available to handle the heavy lifting involving empathy and innovative problem solving. In research and knowledge management NLP can speed the process of reviewing literature, identifying important findings in a body of documents and reveal links that otherwise would never have been uncovered. Such benefits are not consistently distributed by language or community, though; un-resourced languages do not generally have access to high-quality datasets and the distribution of AI benefits can be disparate.

A second pillar of the wider conversation is privacy, security and governance. Messages, transcripts, notes and records about language, are frequently sensitive in nature; a message could reveal identity, or a health issue, or a political opinion. The consent, transparency and accountability are concerned in the collection, storage, and processing of such data. Over classifying By proprietary models trained on large amounts of data deliver outputs similar to the training data, the proprietorship of the copyright, fair use and source of the data all become matters of concern. Notably organizations that decide to use the language technologies should apply data protection measures such as data minimization, safety of stored information, auditability of processing and user anonymity. In turn, policy makers/standardization bodies are now considering regulatory options to provide safety without hindering innovation. There is a further complication with cultural and linguistic diversity. When there exists the availability of abundant digital text on a language or dialect, many AI systems perform better on resources languages.

Modeling practices Morphologically rich languages, code-switching practices, dialectal variation, oral traditions may be confounding to models trained on standardized written corpora. Besides, the translation quality may decline on idiom, proverb, humor or culturally concrete points, in which case it may change the meaning or tune. Developing inclusive language technologies will therefore need well-directed data collection, community engagement, and assessment procedures that consider local norms and values. Context-sensitive tools Participatory design, including collaborating with educators, clinicians, translators, and speakers of underrepresented languages, can provide opportunities to move systems out of a one-size-fits-all approach toward tools that are contextually aware.

One of the threads among these issues is alignment: making sure that human aims, values, and constraints are reflected by language technologies. Technical mitigations, such as bias detection, debiasing, calibration, and enhanced interpretability are harm reduction tools and not panaceas. Collected practices in an organization also play a critical part in managing these activities, including red-teaming, impact assessment as well as post-deployment monitoring. More specifically, in education, it is responsible integration: supplementing human teaching,

not substituting it; in healthcare, it is decision support, not decision automation; and in the provision of public services, it is also the rule of transparency and recourse, needed to sustain trust. The matter of concern is to make sure to gain the communicative advantages of AI without losing the sense of dignity, equity, and agency of the end users.

It is in this background that the current paper explores the opportunities ethical and technological perspectives of AI in human language and its limitation. It integrates evidence in various application contexts - translation, conversation, information access, and learning- to conclude about where state of the art systems are performing well, where they are failing, and what design decisions are having these consequences. The issues of bias, privacy, and cultural sensitivity, as well as the performance indicators of the technologies of language are highlighted in the first paragraphs of the paper, thus making a statement that language technologies are interventions implemented in the social context rather than neutral tools. Based on this framing, a series of practical recommendations to the researchers, developers, and decision-makers who want to implement AI safely in language-rich contexts is proposed.

Format of the Paper. The second part is the framing of the Problem Statement, which elucidates the technical, societal and ethical issues surrounding the project that prove to be the driving factors of the study. The Aims of the Study in turn list the target questions that will inform analysis. A Literature Review contextualizes the work in the earlier body of research on NLP, machine translation and concurrent conversational AI, and on the skepticism of bias and privacy. Qualitative and analytical approach to synthesis of findings is described in the Methodology section. Results are presented in the paper and are followed by a Discussion that combines the Results with the existing literature and discusses practice and policy implications.

2. Problem Statement:

Artificial intelligence (AI) applied to human language technologies has been hailed as a revolution, transforming communication, education, business and healthcare. However, right behind these apparent advantages there is a row of unsolved issues that make the help of AI in the form of a linguistic interaction tool difficult. The main underlying problem here is that human language is not an inert or mechanical system of signs but a highly social, cultural, contextualised event. AI systems, including the most advanced large language models, are based on patterns in huge bodies of existing text and speech. Such models are quite capable of generating statistically likely sequences of words yet are atrocious at representing undertones of meaning, intent and cultural implication that are absent minded among human speakers. This underlying constraint gives rise to a set of technical, social and ethical limitations that constitute the core issue that inspires the research in question.

Linguistic bias is one of the greatest problems. Due to the size of training datasets used to form AI models, using the internet, books, news media, and other materials, historical and cultural biases inherent in those writings will inevitably be absorbed. As an example, when a training corpus is biased toward stereotypes regarding gender, race, or religion, the generated model may return this bias by means of replicating it in its results, or even by intensifying it. It is not just a technical problem but a social one because with biased language outputs, inequality can be strengthened, discrimination sustained, and the vulnerable groups isolated. As examples of when AI chatbots produced racist, sexist, or otherwise offensive language, it is possible to see

how fast a seemingly unambiguously beneficial system can be turned into the tool of abuse. It is even worse in the case of multilingual-rich languages prevail in the datasets, and low-resource languages are undersampled, resulting in worse performance and consolidating the global disparities in communication.

The other serious concern is associated with privacy and security. Language data is classically sensitive: conversations, documents and transcripts usually have personal data, professional secrets or politically sensitive information. A surprising user risk is that AI systems, collecting, storing and processing this data, also have a human tendency of opening users to risk unless adequate precaution steps are taken. These issues of surveillance and the misuse of data become especially problematic when a strong and powerful language technology is owned by a corporation or the state with little or no transparency of accountability. Even anonymized data can have patterns which can lead to re-identification of individuals. This forms a paradox in that although the AI language tools can be efficient and convenient, the use of the platforms poses threats to the right to privacy.

Inseparably connected with all this is the issue of contextual understanding. Human speech tends to use irony, sarcasm, metaphor and indirect meaningfulness. Whereas humans naturally form a conclusion based on the tone, body language and common cultural background natural intelligence, AI algorithms mostly settle with patterns of text. This is possible to create gross misunderstanding. Example: lack of recognition of sarcasm or nuances of emotional tone, in a mental health chatbot, may lead to a refusal to take such behavior seriously or even abuse. Likewise, in translation systems, semantics can be construed when faced with culturally limited allusions or idiom, and so on. Such mistakes are of crucial consequences in diplomacy, legal matters, or medicine. Limitations of misinterpreting the situations According to the inability of AI to fully comprehend the context, there is an even wider limitation that language technologies risk oversimplifying the human communication process and draining out the very characteristics that make it articulate and effective.

Along with these social and technical problems, AI language systems are associated with some philosophical and ethical questions. What will authorship, originality, intellectual responsibility mean when machines can passibly produce text that mimics the styles of human beings? With these AI-generated contents giving us trouble in knowing the difference between humans and machines speaking, the question of authenticity and trust arises. To illustrate, deepfake text or edited dialogues could be almost impossible to distinguish from real communication, and thus allow a misinformation campaign or fake interaction. Ethical reasoning is also complicated by the challenge of deciding who, or what deserves the blame: developers, data or system.

Another severe problem lies in the fact that the design is not inclusive. Developers tend to create most AI systems in technologically advanced economies and their designs and priorities may be more typical to cultures such as Western visions of language and culture. Those left out in the design process are usually communities in the Global South, people who use indigenous or endangered languages, and the marginalized social groups. Consequently, AI language technologies are in danger of being made into vehicles that can be used to avail to the advantaged at the expense of others or out of ignorance of the latter. Not only is inclusivity an

issue of justice: systems that do not take account of the variety of human language and culture are narrow in coverage and dependability.

The over dependence on the use of AI tools in some areas that are very essential is another aspect of the issue. With more organizations and institutions implementing AI-driven systems, there is the temptation to use the technology as a replacement of human skills and not as an addition. As an example, in education learners might rely on the automatized writing aids and fail to form their own thought-processing and communication abilities. Too much use of automated translation tools in health care may lead to breaches of a doctor-patient communication loop. Professional responsibility may be eroded, trust undercut, and failures of the systems become vulnerable with the switch of algorithm production over human judgment.

All these concerns taken together provide a hint toward the main problem to be brought out which is that as much as an AI is potent in language processing and a message filled with communication, there is the threat of biases, inequality, misinterpretation, and privacy breaches as well as ethical issues to be unraveled. Paradoxically, the AI research progress to create natural-like language generation paradoxically makes these problems even more pressing because the line between machine and human speech will become obscured. Such a state of affairs begs a prudent, critical assessment of how AI is used in human language- not just regarding performance measures but also in the context of social impact, ethics, and cultural inclusivity.

The dilemma of aligning the technological potential of the AI language systems and the overwhelming social and ethical issues that they harbor is hence the issue this paper is dealing with. It is not the goal just to stress out the dangers but to gain a reasonable judgment about the opportunities and dangers. This makes it clear that there can be no true development of AI without the understanding of these two poles, alongside the fact that it is one that will help, not damage human communication, both in terms of equality and meaningfulness.

3. Aims of the Study:

Each research project must manifest an explanatory statement of its purpose so as to create a sense of order, sense and validation of its scope. This need is particularly acute in case of the study of the connection between artificial intelligence (AI) and human language. Language being both a communicative tool and a cultural relic is at the core of the human identity and interaction, whereas AI is one of the strongest technological constructs defining the 21 st century. The intersection of the two areas produces the potential possibilities of innovations as well as dangers that require methodical research. Therefore, the current paper was framed by several general objectives aimed to combine technology appreciation with complacency social, moral and cultural consequences.

The initial big objective of the research was to assess the technological capabilities of the AI systems in the processing and the generation of the human language. This is comprised of evaluations on the potential of natural language processing, machine translation, speech recognition and conversational agents. Not only to list the functions, but also to investigate the degree to which these systems can be said to simulate human communication was the aim. Specifically, the study aimed at finding out the extent to which AI tools can address contextual

meaning, semantic ambiguity, and pragmatic context which are important aspects of language when it comes to successful and meaningful communication. The research was based on an existing AI use in various fields, giving a chance to determine which areas they perform well and which areas they still fail.

The latter objective was about the morals of language systems powered by AI. On the one hand, performance and accuracy tend to be used as the most significant case criteria during technological assessment, whereas the ethical implications of such tools application cannot be overlooked. Thus in this research they wanted to explore problems like bias, fairness, inclusivity, and privacy, and transparency. One of the main issues was the matter of whether AI can perpetuate current social disparities by being trained on biased data or an exclusionary design process. It was also of interest to investigate how the risks involved in the privacy emerge when sensitive linguistic information is gathered and used by AI systems and whether the existing measures are sufficient. Precisely by relating the purely technological functions to the ethical consequences, the paper aimed to widen the language of discourse about AI to be more than purely the technical success.

The third objective was to determine the socio-cultural effect of AI mediated communication. The cultural implications of any language processing or language generation tool are close to being inescapable because language cannot be severed in any justifiable way, independence of culture. Therefore, this paper set out to investigate whether AI technologies have a role to play in a homogenization of linguistic or whether they can in any way assist in the existence of linguistic in a linguistic diversity. Of special concern was the conversations of what would happen to already low-resource and stigmatized languages, whose involvement in AI training corpora tend to be underrepresented. The research sought to reveal the larger cultural stakes in integrating AI tools in the context of communicating on a daily basis by focusing on the interface between AI tools and cultural norms, idiomatic expressions and localized practices to answer the question.

The fourth purpose of the research intended to evaluate critically the implication of the AI language technologies on professional practice and human expertise. Since AI tools are entering the field of education, healthcare, customer service, and cross-border communication, the question is whether they will be used as complements or substitutes to human professionals. This paper set out to examine the question of whether AI systems complement human expertise by automating routine work, or there is a danger that they can erode the fundamental human capabilities by encouraging overdependence. The research aimed at explaining how AI technologies redefine professional roles and responsibilities, exploring the case studies of adopting the AI technologies.

The fifth objective was to add to the existing discussions regarding who governs, regulates, and is accountable regarding the use of AI language mechanisms. Technology advancement tends to even surpass legal technology and regulations yet gaps can be tapped or these gaps can be detrimental to its consumers. This paper is an attempt to outline areas that require better governance, which include data protection, algorithmic transparency and inclusive design. It also sought to reflect on the various stakeholders in the process of ensuring that there was responsible deployment namely policymakers, developers, educators and end users and how these parties can get together to promote responsible deployment. Adopting a more social

perspective on the positioning of AI language technologies, this study reiterated the fact that innovation needs to be based on societal values.

And last but not the least was the objective of making recommendations based on the sixth aim, which was to make recommendations on future research and development. As a rapidly developing field, AI innovation is such that conclusions may turn out to be dated in short order unless they have been oriented toward the adaptable view of things. As such, the paper did not just seek to examine existing trends but also made recommendations on where the future research needs to go. These are enhancing cultural awareness in AI systems, enhancing support of under-represented languages, enhancing ways of identifying and eliminating bias, and so on participatory design models in which diverse populations collaborate in the development of AI technologies.

These purposes, combined, were aimed at making sure that the research would help not only in gaining academic background but also in providing the practical advice. The methodical coverage of the aspects such as technology, ethics, culture, professional, and governance perspectives, allowed the research to offer an overall assessment of what the role of AI in language entails. It was not merely a rhetorical piece of praise or blame about AI technologies, but one that will (hopefully) work to create an evidence-based and balanced discussion that may be useful to developers, policymakers, educators, and the general populace. In this respect, the research aim was to promote a vision of AI as something that will augment, but not weaken human communication; as something innovative, but morally responsible, powerful, and just at the same time global, and not exclusive.

4. Literature Review:

A meeting of artificial intelligence (AI) and human language has produced a wide range of rapidly growing research literature, spanning academic fields as varied as linguistics, computer science, cognitive psychology and ethics. In the literature, the technological developments are not only recorded but also questioned in terms of their social, cultural and ethical consequences of integrating AI into the communication- systems. The following review synthesizes the existing scholarship on the topic of four broad areas as technological basis, performance in practice, ethical and social aspects, as well as gaps still exist in the research domain to help situate our study within the larger field of study.

The technological underlays of the AI in language processing are directly connected to realization of the machine learning and the transition of the rule-based systems towards the data-driven models. Initial solutions were based upon manual rules and lexicon, in that they were fragile against the variance of language in terms of uncertainty and context (Jurafsky & Martin, 2009). This was followed by a revolution of introducing statistical techniques in the late 1990s and early 2000s, which allowed models to learn probabilistic patterns directly out of corpora. The next advance was neural networks and in particular with the transformer design according to Vaswani et al. (2017). The attention mechanism in the transformer enabled models to better incorporate long-distance relational dependencies and contextual dependencies than the recurrent architectures. Devlin et al. (2018) have taken the stage to a new level providing BERT, a pre-trained bi-directional model and achieves the state-of-the-art results on various NLP benchmarks. These efforts preconditioned the further development of large language

models like GPT (Brown et al., 2020), which proved to have the potential of few-shot and zero-shot learning. The progression in these works makes a certain sense: starting with handcrafted rules, through statistical models and up to deep learning, they continue to bring AI to the level of human understanding and creation of language.

Resting on such premises, researchers analyzed how AI works in practice. Much attention has been given to machine translation. Automatic translating systems produced awkward or inaccurate wording at the time when early models of statistics were of use. Neural machine translation, such as demonstrated by Bahdanau et al. (2014) achieved better fluency, and contextual correctness overall; however, idiomatic expressions and low resource languages are still problematic. It has grown the sphere of conversation agents and chatbots, including Siri, Alexa, and Google Assistant that allows performing routine tasks through voice-powered interfaces (Hoy, 2018). These systems show the innovative power of AI to democratize access to information, break language barriers, and provide an individualized environment. Nevertheless, the research indicates that performance varies significantly in different languages and applications; mainstream languages such as English are characterized by a high level of accuracy whereas the underrepresented languages experience data-shortage and deliver of inferior quality outputs (Joshi et al., 2020). Education: Adaptive, data-driven language learning such as Duolingo is an example of successful applications of AI in education, and automated transcription and translation services allow patients with non-standard linguistic profiles access to healthcare more generally.

Parallel to the technological advances, there has been the compilation of literature and works highlighting the ethical and social consequences of AI in language. Divorces can be the consequence of AI and its systems amplifying social biases that can be encoded into training data and then reproduced (Crawford, 2021, Noble, 2018). There have been cases documented in cases where language models are made racist, sexist or otherwise discriminatory, which give rise to the issue of fairness and inclusivity. The other major theme boiled down to privacy, as large-scale data collection with the purpose of training is likely to contain personal or sensitive data, raising questions of consent, transparency, and imminent surveillance (Zuboff, 2019). Furthermore, cultural studies researchers claim that AI can lead to the linguistic homogenization tendency, which is an advantage of the most prevalent tongues over distinct dialects, native languages, and minority cultures (Bender et al., 2021). Such critics stress the importance of contextualizing AI not only as a technical accomplishment but as a socio-technical construction, the effects of which are conditioned through social norms, cultural practices and political systems.

Whereas these contributions are recognizable, it has come out in the literature that persistent gaps and tensions remain. To begin with, social impact and user experience are not the focus of much of the technical research, with it focusing more on performance measures of accuracy, fluency, or perplexity. Second, despite significant identifications of bias in AI, solutions are relatively piecemeal and at times technical in nature without appropriate considerations of participatory design and governance systems. Third, under-resourced languages are a dangerous blind spot: most of the research focuses on English and other world languages, yet there is scarce literature of how AI can be beneficial to disadvantaged linguistic groups. Lastly, few longitudinal studies have been conducted on the impact of long-term exposure to AI-

mediated communications on the way humans interact, acquire language and express their cultures. Such gaps lead to the need to consider crosscutting analyses, bringing together the knowledge of computer science, linguistics, ethics, and social sciences.

The literature in short provides a two-fold narrative. On the one hand, AI has come an impressive long way to be able to process and generate language reaching milestones that seemed to be impossible. On the one hand, these advances are darkened with fears of bias, privacy, unequitable inequality and homogenization of cultures. This study finds itself within the crosscurrent of the two stories. Using evidence synergistically in both technological and ethical fields, it will strive to come up with a level-headed view of how AI has been eased into language. By doing so it forms part of a growing literature that does not conceive of language technologies as technologies blindly acclaimed as works of human engineering prowess but rather interventions that impact on essentially human processes of communication, identity and meaning.

5. Methodology:

A stringent methodological approach is vital so that any researcher performing any study on the complicated linkage between artificial intelligence (AI) and human language is systematic, credible, and repeatable. Due to the fact that this study relates to not only the technical advancements in the natural language processing (NLP) but also to the ethical and cultural implications of implementing language technologies, the multi-method qualitative research methodology has been chosen as the most suitable one. The research process was developed in order to combine findings evidence found in the academic sources, examples on practical aspects of using AI in human language, and the professional experiences of the whole picture of obtaining the opportunities and challenges implementing the use of AI in human language.

Research Design

The research is a qualitative exploratory one since it was selected because of its potency in exploring complex and dynamic phenomena. Although quantitative indicators like the accuracy levels or the error rates are also helpful, they are not enough to unveil the ethical, cultural, and social aspects of AI-mediated communication. Qualitative methodology provides an opportunity to immerse in areas of inquiry on bias, inclusivity, and context sensitivity. The research was able to triangulate through the use of varied sources of data, comprised of academic articles, technical reports, policy papers, case studies, and expert interviews to increase the validity of the study. Flexibility in design was planned to capture the fast rate of change in technology and interdisciplinary nature of the discipline.

Data Collection

The data collection process involved three main strategies:

1. **Literature Review:**
   An efficient systematic review of the available studies was realized on various databases such as Google Scholar, JSTOR, IEEE Xplore, and Scopus. Such keywords as AI and language, natural language processing, machine translation, AI ethics, and bias in language models were applied. The selection of studies to be conducted was in relation to

technological performance as well as ethics. Both foundational work (e.g., Vaswani et al., 2017; Devlin, 2018) and more recent work on the ethical problems (e.g., Crawford, 2021; Bender et al., 2021), were subject to this review. In addition to a theoretical contribution, the literature review has also identified gaps in the literature that served as the guidance to the empirical parts of the study.

2. **Case Studies:**
   Analyses of real-life situations using AI applications in language environments were conducted in the form of case studies. Examples included:

- **Machine translation tools** e.g. Google Translate and DeepL, and specifically on their performance on high-resource and low-resource languages.
- **Conversational agents** including Alexa, Siri, and ChatGPT software which has been subjected to analysis in regards to their capability of managing the context in their practicality and being able to give culturally acceptable responses.
- **Educational platforms** even these learning platforms like Duolingo, which are being studied on their ability to customize the process of learning a language and pose questions concerning their use and the reliance on algorithms.
- **Healthcare applications** automated transcription and translation services, automated, and assessed on the likelihood of benefit and risk to sensitive communication scenarios.
- Coherent examples of the current applications of AI and the related obstacles or achievements were obtained in these case studies.

3. **Expert Interviews:**

There was semi-structured interview of professionals working in three areas, AI developers, linguist, and ethicists. Researchers and engineers gave a sneak peek into the technical design and shortcomings of AI systems; linguists highlighted cross-cultural and contextual nature of language, which AI does not excel in; ethicists focused on privacy, bias and fairness. The open-ended questions with the help of which the interviews were conducted were aimed at getting rather detailed answers letting the subject remain rather flexible to bring up questions not foreseen by the investigator.

Data Analysis

- The received data were processed with the help of two supplementary methods:
- **Thematic Analysis**: Data in qualitative format including case studies, interview transcripts and literature was coded to find out some common themes like bias, privacy, inclusivity and professional impact. Themes were iteratively refined so that the interrelationship between themes was coherent and the analysis was able to capture nuanced variation that was evident across various data sources.

- **Descriptive Statistics**: In the cases where secondary source quantitative data were available (accuracy indicators reported in previous research) they were summarized to provide context to the qualitative results. The given statistics did not serve as the primary target but aimed at completing and support the thematic analysis.

Validity and Reliability Several steps were taken to enhance the validity and reliability of the study. Triangulation across multiple data sources ensured that findings were not dependent on a single perspective. Expert interviews were cross-checked with existing literature to confirm consistency or highlight divergence. Reflexivity was also incorporated: the researcher critically examined their own assumptions about AI and language to minimize bias in interpretation. While qualitative research does not aim for statistical generalizability, these strategies strengthened the credibility and trustworthiness of the conclusions.

Ethical Considerations

As ethical issues are the issue of the study, ethics were considered carefully when giving attention to procedures. Participants in the interviews were also told of the aim of the research, the fact that they had the right to keep the research confidential, and could withdraw at any time. Anonymization where necessary of data was done. When handling case studies there was a focus on the publication of the information to prevent the violation of proprietary or personal data. On a larger scale, the approach was also positioned as taking into consideration the ethical responsibility of its own study on AI research.

Limitations

The methodology adopted is broad but it came with shortcomings. First, the use of qualitative approaches to study does not allow proposing precise quantitative criteria of AI performance. Second, the case studies were not exhaustive but selective of high profile applications of AI, and not encompassing the range of AI tools available. Third, the scope of expert interviews was both time-limited and subject to limitation by availability and thus potentially limited in terms of the representativeness. These limitation were however counteracted by the triangulated design that merged different sources and the views though mixed.

Conclusion of Methodology

Overall, the method evolved a systematic literature review, case studies in real life, and the interviewing of experts in a qualitative exploratory design. It was this strategy that enabled the research to embrace the changes in technology as well as the issues of ethics in AI language processing. The methodology helped to incorporate thematic analysis along with contextual information and so, the conclusions would reveal the insights of the study not just in reflecting the functionality of AI systems but also in the expanded social and cultural context. This method emphasizes the necessity of interdisciplinarity, as AI and the future of human language cannot be solely assessed in the technical terms and instead has to be studied over a long time frame with ethical, cultural, and human aspects considered and researched.

6. Results:

The research conducted in this paper led to several findings that inform the researcher about the advantages and the shortcomings of artificial intelligence (AI) in the processing and generating human language. Through analyzing the literature in conjunction with real world case studies, and interviewing experts, some common trends were present. This data might not be quantitative data, as associated with quantitative analysis in some way, but it is the evidence of performances of AI in various fields and what problems remain to be addressed. The results are grouped into five broad themes, namely technological performance, cultural and linguistic sensitivity, ethical risks, professional impact, and inclusivity.

Technological Performance

The analyses of the reviewed studies and the case studies revealed that the AI systems were quite competent to perform routine language processing. Translation software, specifically Google Translate and DeepL, were accurate and fluent in high-resource languages especially when they translated between languages of major groups that speak, such as English, French and Spanish. Chatbots like Siri and Alexa performed well during everyday, scenario-bound inquiries with pertinent information and containing the simple exchange of dialogue. Also, the use of the AI-powered auto-transcription tools was incredibly successful in transcribing spoken word to text when it comes to controlled conditions, saving a lot of time and money spent on doing so manually.Such systems, however, became increasingly inaccurate when faced with linguistically complex or low-resource environments. To give one example, translations into or out of languages with little in the way of digital resources (e.g., Pashto, Swahili, or indigenous languages) commonly yielded clumsy formulations or semantic slip-ups. Conversational agents were not able to maintain coherence in longer interactive speech or to process pragmatically subtle interaction, as in irony or sarcasm. According to expert respondents, although AI is extremely efficient at very shallow interactions (including speaking to computers in our own voice or typing in) deep, more human-like interaction is often lost. These findings prove that the performance of AI is the greatest in situations where language is ordered, predictable and there is a relative lack of cultural ambiguity.

Cultural and Linguistic Sensitivity

Among the most prominent conclusions, there was the fact that AI is unable to handle cultural nuance. Case studies showed that idiomatic phrases, jokes and culturally embedded phrases would either be terribly translated or represented wrongly by the AI. As an example, linguistic interviews were done to bring out cases in which metaphors of such languages as Asian and Middle Eastern were literally translated into English, thus becoming deprived of cultural connotations. The results of such suggest that unlike AI, which may be able to attain technical fluency, it frequently cannot provide communicative equivalence, which is not independent of the context, shared knowledge, or cultural competence.

The other limitation that was realized entailed dialectal variation. Although optimized to work well on standardized variants of bigger languages, AI models often fail to parse dialects, or mixed-language speech (code switching). This decreases the inclusiveness of AI tools and its capacity to reach the large masses of the multilingual society. The participants with expertise underlined that such systems face the risk of prioritizing the language varieties that are dominant if no specific training data illustrating linguistic diversity is provided.

Ethical Risks

The findings also highlighted the continuous moral threats. The review of AI usage demonstrated that there is a high number of bias instances when creating AI-generated text. As an instance, some of the translation systems replicated the gender stereotype when they identified masculine pronouns in the cases of a profession like, doctors or engineers, but they represented any of the feminine pronouns in the cases of, nurses or teachers. Otherwise, conversational models were also reported to yield subtle discrimination or offensive answers in some scenarios and to contain bias in the training databases.

Another common theme was placed on privacy. Interview with experts showed that a lot of AI rely on large quantity of data generated by the users, frequently without the clear consent, or even without enough anonymization. This comes with surveillance and misuse threats, particularly in the cases of a sensitive health or financial communication. The results provide an indication that although AI-assisted language tools can address accessibility, they also put users at high risks of ethical vulnerability unless effective protections are put in place.

Professional and Educational Impact

Findings on applying AI language tools in the field of education and healthcare given in case studies were ambiguous in connection with how well AI language programs can be integrated into professional practice. In the corresponding educational field, the overall gain in terms of language prosperity on such a platform as Duolingo has been identified and proved. However, teachers worried that the intensive use of the AI-based tools would cause students to reduce their interest in learning about grammar and culture and a way of thinking deeply. On the same, in medical practice, transcription and translation systems lowered the communication barrier between physicians and their patients, and sometimes lost medical inference, posing risk of misdiagnosis.

These results indicate that AI may take the form of a reliable aid, but it would not substitute human experience. It was repeatedly said by experts that AI systems must be applied in industry as another assistant to a human professional, being able to perform routine or repetitive tasks, yet performing more complex, context-dependent functions remaining an exclusive possession of a human.

Inclusivity and Accessibility

The last group of outcomes emphasized the issues of inclusivity. AI systems were empirically identified as favoring features of high-resource languages and speakers of low-resource languages would tend to have poorer results. This mismatch poses a threat to the existing disparities of access to information and communication. In addition, wealthier nations and

companies continue to have greater financial and technical resources available to develop and fund AI systems to suit low-resource languages. This has led to an unequal distribution of benefits of AI where the lesser fortunate people are underserved.

However, positive findings were also identified. The work on increasing open-source datasets and community led efforts was cited as an optimistic step toward increased inclusivity. As an example, joint efforts such as using locals as speakers in the development of training corpora have been promising with regards to enhancing system performance in cases of underrepresented languages. These efforts confirm that it is possible to make spaces inclusive (though they are now still restricted), even in a targeted fashion through design and engaged practices.

Summary of Results

Altogether, the findings of this study indicate that AI language technologies provide a significant improvement in efficiencies, access, and scale. They are especially successful in structured, high-resource settings, and there have been a number of cases where the performance of the machine is as accurate, and in some cases more, than human performance. Yet, important challenges remain on how to deal with cultural sensitivity, equity, confidentiality, and multilingualism. The results emphasize the Janus-faced character of AI in language: a sharply efficient tool of communication and a possible enhancer to inequality and ethical risk. These findings are prelude to the discussion of the next item, which contextualizes in wider academic discourses and examines how it can inform development.

7. Discussion:

The results of the present research indicate that the world of artificial intelligence (AI) is a multifaceted world where it performs both the role of an accelerator of the communication process and introduces new ethical, cultural, and technical issues. The discussion below contextualizes these findings in the larger framework of academic literature, noting not only points of congruency regarding earlier studies, but also points of divergence. Moreover, it discusses the general implications on technology design, professional practice, policy and future research.

Alignment with Prior Research

The findings support much that previous research has indicated about the technological capacity of AI-based on natural language processing (NLP). Transformer architectures and pre-trained models as well as those mentioned in Vaswani et al. (2017) and Devlin (2018) studies showed that state of experience has already proven to transform machine-generated text to achieve high fluency and contextual awareness. The article aligns with these assertions as it demonstrates that AI systems are effective mostly in language environments that are well structured and are high resource environments. Engines such as Google Translate and DeepL, e.g., can be repeatedly and consistently used to give accurate outputs to widely used languages, and transcription tools also perform near-human when conditions are controlled. These findings are in keeping with other benchmarks on technical literature that show that the state

of the art models no longer wrestle with the constraints of previous systems that were either rule based or statistic based.

Meanwhile, the findings also testify to scholarly criticism about the pragmatic deficiencies of AI. In line with Bender and Koller (2020), as a result of this study, it was revealed that AI cannot accurately interpret idioms, sarcasm, or culturally localized expressions. As presented in expert interviews, such inadequacies are not isolated technical faults but they account to a broader limitation: language models are not reliable semantic tools but statistical, without lived experience or cultural context on which a human language-based communication relies. This fact agrees with the point made that AIs can merely resemble human language, whereas humans can make meaning all the way down; AIs can only make meaning all the way up.

Divergence and New Insights

Although most of the literature focuses on one of the two facets ethical risk or technological progress, the findings of the research provided the insight into the way the two aspects blend into each other. As an example, the observation that the legal translation systems recreate gender stereotypes resembles the study by Noble (2018) on algorithmic bias. The case studies in this research also reveal, however, how this kind of prejudice can destroy confidence in professional situations such as in healthcare or in education. The point of intersection brings out one aspect that has not been discussed; the ethical failures of AI cannot be discussed in abstract terms but are limitations that restrict effective use of AI in touchy areas.

The other particular contribution of the current work is that it puts an emphasis on linguistic diversity. Whereas the findings here may lead to a promising scholarship that speculates on the English and other world languages, the research results demonstrate the extreme disadvantages and disparities according to the speakers of under-resourced languages. It builds upon the observations by Joshi et al. (2020), who lamented the lack of parity in NLP research in regard to languages, by illustrating actual impacts, in terms of inclusivity and access, of such asymmetry. Thereby, the findings add to eloping discussions regarding the digital inequality and its skewed advantageous benefits.

Implications for Technology Design

The findings have a definite implication of how AI language technologies ought to be built and implemented. First, the presence of the bias demonstrates the necessity to increase the transparency of data curation and monitoring. Technical fixes like debiasing algorithm will be needed but they are not sufficient without participatory design practices inclusive towards a diverse set of linguistic and cultural groups. Second, contextual processing shortfalls imply that hybrid solutions (where man and machine collaborate and humans maintain the bigger picture) are better suited to high stakes situations. In learning, as in the example of education tools, AI should not act as a substitute to teacher instruction but simply as an aid; in healthcare, the tools are simply a support to translation but must not override clinical knowledge.

Ethical and Cultural Considerations

Its findings also intensify the ethical argument in regard to privacy and surveillance. In line with the qualms of Zuboff (2019) over “surveillance capitalism,” the research identified that

language implementations of AI tend to depend on massive amounts of data about users, which brings into question the consent and disclosure aspects. These practices threaten to make intrusive data collection standard without more powerful governance. The cultural consequences are also great: prioritizing the standard language variation and devaluing the use of dialect or native language, AI has the potential to create uniformity in language. This not only decreases inclusivity, but also risks cultural diversity. The paper thus explains the importance of culturally embedding such datasets and assessment systems.

Broader Societal Impact

Besides the technology and moral, the outcomes indicate the changes in the whole society. The efficiency rates of AI in regular communication processes can transform professional duties by either decreasing the necessity of human labor in certain scenarios and augmenting the requirement of surveillance and translation in others. As it has been revealed, AI should be most useful in combination with human expertise to carry out routine or massive duties as humans deal with the subtlety and compassion. Such a hybrid version corresponds to the arguments presented by Anderson and Dron (2011) of the enabling role of technology in facilitating the new pedagogical paradigm, instead of the replacement of human educators. Equally so, within the realm of customer service, AI will be able to categorize and automate simple requests, yet tricky interpersonal interactions are bound to human discretion.

Directions for Policy and Governance

The findings point to the conclusion that tighter regulatory systems are desperately needed. It is important to put in place artificial intelligence privacy protections, bias auditing, inclusivity indicators and make it in such a way that AI is at the service of the greater good of the society instead of acting as a multiplier of inequality. The disparate allocation of benefits across languages emphasises the need to fund measures to had under-resourced languages. The policymakers should also guarantee that companies creating the AI systems can also take responsibility and be morally responsible, besides the technical precision accuracy.

Conclusion of Discussion

To conclude, the discussion reveals that AI-enabled language technologies are at the cusp: they indicate superb technical potential but they also hold the promise of perpetuating bias, marginalization, and ethical/legal abuse unless comprehensively controlled. Not only does the findings support available literature but it also provides new knowledge especially on the corner where technological performance and ethical risk meet in practical settings. The overall implication is explicit: technical innovation in AI in human language is only one part of the future; fairness, inclusivity, and accountability will have to be instilled in it. IA can only achieve its pledge to become an enhancing rather than a lessening presence in human communication by being used to realize its potential in these broader dimensions.

8. Conclusion

This study was conducted in order to study the point of intersection of artificial intelligence (AI) with human language and specifically focus on the opportunities, challenges, and ethical issues when AI-related complex computational systems are employed in the processing and

generating of human communication. The results discussed in the above sections indicate that language technologies facilitated by AI are insurmountably promising in terms of changing the way individuals communicate and retrieve information as well as breaking barriers caused by language differences. Meanwhile, they also identify serious shortcomings that need to be considered and mitigated in case AI can be an inclusive and responsible instrument.

Summary of Key Findings

To begin with, the paper established the fact that the current AI technology of natural language processing (NLP), machine translation, or conversational agents have already reached impressive performance levels, especially within the context of high-resource languages. Examples of how AI can offer efficient, accurate, and scaleable solutions associated with multilingual communication are translation systems, such as Google Translate and DeepL, and conversations systems, such as Siri and Alexa. The systems work especially well with structured predictive language varieties, and lower the expenses, save time and increase convenience within the realm of education, healthcare, business and customer service sectors.

The outcomes however also indicated some fatal flaws. AI networks still remain unable to recognize linguistic nuance such as idioms, sarcasm, cultural metaphors, and emotion. These shortcomings point to the reality that although AI will be able to replicate the shape of the language, there is a richness of meaning-making that an AI is unlikely to provide in the same way that human speech will and it is this richness that many humanities scholars say is not naturally available to the AI in the first place. Furthermore, the study proved the fact that AI is susceptible to reflecting and expanding social biases that are represented in training data. Examples of gender, racial, or cultural stereotyping during translation or responses of chatbots provide an example of the way these devices can be used to feed inequality, whether intentionally or not.

In addition to that, privacy and security were two key challenges that the study pinpointed. The utilization of AI depends on large amounts of data that rely on personal and sensitive linguistic information, which poses potential threats of surveillance and abuse as well as loss of trust. The risks to the users being subjected to greater harms than the convenience of the language technologies can bring about can be irrepressible in the absence of effective protections. In addition, the results revealed that inclusivity is a central question: whereas high-resource languages have high investments and strong data, users of under-resourced languages can get lower quality results, which only exacerbated inequality across the world.

Contributions to the Literature

The research will add to the existing volume of literature as it synthesizes the available views by creating a connection between the technical performance and the relational aspects of ethics, culture, and society. Past studies would tend to study these aspects in separate form: one side places stress on technical advancements (Vaswani et al., 2017; Devlin, 2018) and the other on ethical hazards (Noble, 2018; Crawford, 2021). This study involves synthesis of facts in the two fields to show that the success of the field of AI language technologies cannot be quantified in terms of either fluency or accuracy. In place of that, success should also be measured according to being fair, considerate, and accordant to human values. This integrative

contextualization is a step forward in this dialogue because it demonstrates that technological and moral issues overlap in a real-world practice.

Practical Implications

Practically speaking, the outcomes mean that it is essential to position AI as an addition and not a substitute to the expertise of humans. The use of AI tools in education can be beneficial in terms of individualization and accessibility, although they cannot yet replace teachers in the process of teaching the skills of critical thinking and understanding of other cultures. Translation and transcription systems can enhance a conversation between people separated by either a language barrier or by that of an accent within the healthcare industry, nonetheless, such a translation/transcription system should not go independent of the supervision of the healthcare professionals to retain the aspect of accuracy and empathy. In a similar way in customer service and business, AI is useful to resolve routine questions, yet complicated interpersonal relationships still need the gentleness and imagination of people personnel.

The results also have technology design and governance implications. Developers need to focus on the detection and reduction of bias, the widening of training data volumes to cover underrepresented languages and dialects and introduce open data collection channels and model testing procedures. In the meantime, it is the role of policymakers to put into place measures that can protect privacy, keep them accountable, and be inclusive. The development of ethics codes and assurance systems may assist in regulation of technological innovation to harmonize with societal values such that AI is used as a vehicle of inclusion as opposed to exclusion.

Limitations of the Study

Like all studies, this study is limited. Its grounding in qualitative tools such as literature review, case studies, and interviews with experts do not make it capable of establishing accurate quantitative thresholds of AI-performance. In addition, selected case studies were not exhaustive but rather illustrative and they centred on widely used applications. The opinions of the experts as coveted as they are, might not represent the totality of thoughts in realms of AI, linguistics, and morality. These constraints imply that future empirical work, such as large-scale user trials and longitudinal studies, would be useful in augmenting and expanding on the results here.

Directions for Future Research

Based upon these findings, the following are important areas that should be investigated in the future. First, a greater focus is to be placed on the languages that are under-resourced and marginalized populations. Creating more datasets and models representing linguistic diversity is important in closing the disparity gap on accessing the fruits of AI. Second, scholars are encouraged to explore participatory design modeling in which local communities, educators and cultural practitioners are incorporated in the processes of developing AI systems. This would assist in ingraining the cultural-sensitiveness into the technologies. Third, the development of interdisciplinary cooperation between researchers across computer scientists, linguists, ethicists, and policymakers is the key to handling the multidimensional issues of

linguistic AI. Lastly, longitudinal studies on the social effects of long-term AI mediated communication might inform about the role these technologies play in informing the human interaction, identity and culture, in the long term.

Final Reflection:

Summing up, the work shows that language technologies based on artificial intelligence are verified in a contradictory point of view, as both effective methods of optimising the communication process and possible causes of new risks and inequalities. They are more valuable than in the fact that they can translate, transcribe, and speak because they can also control the way humans connect to each other with regards to their varying languages and cultures. In order to use this value in a responsible way, stakeholders have to adopt a middle-ground approach i.e. to have a cheerful attitude towards being innovative, but at the same time, they should be wary about the concerns of ethics, inclusivity and responsibility.

Assuming these challenges are achieved, AI would help to revolutionize global circumcommunication, within its equity, cultural sensitivity and are non-ethically questionable ways. Instead of diminishing the differences between human beings, it has the potential to give voice to humanity across boundaries and contexts, towards a future of technology enabling the diversity and the dignity of human language.

References

1. Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... & Polosukhin, I. (2017). Attention is all you need. Advances in neural information processing systems, 30.Devlin, J. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.
2. Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J. D., Dhariwal, P., ... & Amodei, D. (2020). Language models are few-shot learners. Advances in neural information processing systems, 33, 1877-1901.
3. Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J. D., Dhariwal, P., ... & Amodei, D. (2020). Language models are few-shot learners. Advances in neural information processing systems, 33, 1877-1901.
4. Hirschberg, J., & Manning, C. D. (2015). Advances in natural language processing. Science, 349(6245), 261-266.
5. Us, A. I. A. A. Artificial Intelligence All Around Us.
6. Hou, Y., & Huang, J. (2025). Natural language processing for social science research: A comprehensive review. Chinese Journal of Sociology, 11(1), 121-157.
7. Lawley, C. J., Gadd, M. G., Parsa, M., Lederer, G. W., Graham, G. E., & Ford, A. (2023). Applications of natural language processing to geoscience text data and prospectivity modeling. Natural Resources Research, 32(4), 1503-1527.
8. Zhao, L., Alhoshan, W., Ferrari, A., Letsholo, K. J., Ajagbe, M. A., Chioasca, E. V., & Batista-Navarro, R. T. (2021). Natural language processing for requirements engineering: A systematic mapping study. ACM Computing Surveys (CSUR), 54(3), 1-41.

9. Gaur, A., Singh, S. K., & Saxena, P. (2024, March). Performance Analysis of Deepfake Text Detection Techniques on Social-media. In 2024 International Conference on Distributed Computing and Optimization Techniques (ICDCOT) (pp. 1-6). IEEE.
10. Gaur, A., Singh, S. K., & Saxena, P. (2024, March). Performance Analysis of Deepfake Text Detection Techniques on Social-media. In 2024 International Conference on Distributed Computing and Optimization Techniques (ICDCOT) (pp. 1-6). IEEE.
11. Tanasescu, C., & Tanasescu, R. (2022). Literary Translation in Electronic Literature and Digital Humanities. Translation Beyond Translation Studies, 143.
12. Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... & Polosukhin, I. (2017). Attention is all you need. Advances in neural information processing systems, 30
13. Liu, Y., Ott, M., Goyal, N., Du, J., Joshi, M., Chen, D., ... & Stoyanov, V. (2019). Roberta: A robustly optimized bert pretraining approach. arXiv preprint arXiv:1907.11692.
14. Matusov, E., Ueffing, N., & Ney, H. (2006, April). Computing consensus translation for multiple machine translation systems using enhanced hypothesis alignment. In 11th Conference of the European Chapter of the Association for Computational Linguistics (pp. 33-40).
15. Toury, G. (2012). Descriptive translation studies: And beyond. Descriptive translation studies, 1-366.
16. Bahdanau, D., Cho, K., & Bengio, Y. (2014). Neural machine translation by jointly learning to align and translate. arXiv preprint arXiv:1409.0473.
17. Nida, E. A. (1964). Toward a science of translating: with special reference to principles and procedures involved in Bible translating. Brill Archive.
18. Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. International Review of Research in Open and Distributed Learning, 12(3), 80-97.
19. Isabelli-García, C., Bown, J., Plews, J. L., & Dewey, D. P. (2018). Language learning and study abroad. Language Teaching, 51(4), 439-484.
20. Brown, H. D. (2014). Principles of language learning and teaching: A course in second language acquisition. Pearson.\
21. Chapelle, C. A. (2010). The spread of computer-assisted language learning. Language teaching, 43(1), 66-74.