International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2023, Vol. 19, Issue 3, pp. 28-38

Writing with ChatGPT in a context of educational inequality and digital divide

Eduardo Santiago-Ruiz
Universidad Pedagógica Nacional, México

ABSTRACT

Mexico faces significant challenges concerning the digital divide and language-related proficiencies. Considering transformative technologies like ChatGPT, it becomes imperative to examine their implications for Mexican universities. This study is situated within the context of campus 095 at the National Pedagogical University (UPN), aiming to ascertain the perceptions and applications of ChatGPT among both students and educators. One key aspect of this research is its empirical nature. The research methodology involved a combination of participant observation and the analysis of students' assignments spanning from January to June 2023. The findings of this investigation reveal that students possess an elementary grasp of ChatGPT's capabilities. Predominantly, it is employed as an information retrieval tool, with limited awareness about its proclivity for generating fabricated content. Many students struggle to identify grammatical or organizational issues in their texts and lack the proficiency to effectively employ prompts to correct them. Conversely, educators exhibit a lack of familiarity with ChatGPT, impeding the learning process as students adopt its use. While the utilization of ChatGPT holds the potential for substantial educational benefits, it is imperative to take tangible measures to ensure that these advantages materialize within education systems characterized by a digital divide and deficiencies in academic writing, like the Mexican context.

Keywords: *Digital divide; ChatGPT, ICT; prompt literacy; AI literacy*

INTRODUCTION

Artificial Intelligence (AI) has the potential to drive economic development, social progress, and enhance educational quality. However, it can exacerbate exclusionary conditions for those who cannot take advantage of its benefits. Mexico is a country facing serious challenges in terms of the digital divide and language-related skills. In PISA tests, Mexican students scored 423, significantly below the OECD average of 493 (OECD, 2016). Digital gap issues also exist, as only 52.4% of university students nationwide have access to a computer (INEGI, 2021) and few had expert proficiency in ICT (Toudert, 2015). Therefore, with the advent of AI technologies like Large Language Models (LLM) and ChatGPT, the question arises about their impact on Mexican universities. This study was conducted within the context of campus 095 of the National Pedagogical University (UPN). Its objective is to determine the uses and perceptions that students and teachers have regarding ChatGPT in this context of educational inequality. Special emphasis will be placed on analyzing how this tool is employed for the creation of academic texts such as assignments, essays, and theses. A key highlight of this study is its empirical nature. While there is a substantial body of literature on ChatGPT in education, most of it comprises expert opinions, reviews, or even interviews with ChatGPT itself. Moreover, there are only a few articles that empirically analyze academic writing, and those that do often focus on populations in China and the Middle East. In contrast, this paper offers valuable data collected through a qualitative method from a sample of Mexican students and educators.

UPN is a public institution focused on the training of education professionals. It stands out for its extensive presence in Mexico, with multiple campuses and serving over 72 thousand students. The undergraduate programs offered at campus 095 are in the areas of: Pedagogy, Educational Psychology, and Educational Administration. They also offer master's programs aimed at improving

the practices of elementary education teachers. All these programs have traditionally been associated with female students, which is reflected in the student body composition, consisting of 80% women. In the city of Mexico alone, there are six campuses (092, 094, 095, 096, 097, and 098), though they exhibit significant disparities among them. Campus 092, the main campus, boasts top-notch facilities including computer laboratories, Internet connectivity, and projectors in all classrooms. On the other hand, Campus 095, where this research was conducted, experiences unstable Internet connectivity and a computer lab equipped with 6 outdated computers, which is insufficient for a student population of over 200. The absence of these labs prevents many students without personal computers from accessing ICT. Furthermore, it hinders the efficient teaching of more advanced software tools. This would explain, at least in part, why students are proficient in basic software packages like word processors and presentation tools but are largely unfamiliar with more advanced software such as statistical analysis (SPSS, Jamovi, R), reference management (Mendeley), or qualitative research tools (Atlas.ti, MaxQDA).
UNESCO (2019) points out the need to:

> *"strengthen teacher training institutions, and develop appropriate capacity-building programmes to prepare teachers to work effectively in AI-rich education settings" (p. 5).*

However, the teachers at UPN, in general, have negative perceptions about the advantages that ICT can bring to education. Padilla Partida (2018) indicated that, in this university, the use of ICT is limited to email and PowerPoint, while resources associated with Web 2.0 are practically absent. This is concerning, as future education professionals in Mexico receive limited training in harnessing the potential of ICT.

LITERATURE REVIEW

ChatGPT and Hallucination

ChatGPT is a chat interface that allows interaction with GPT-3.5, a natural language processing model that operates by predicting the word or set of words most likely to appear after a given question. In its training, a technique called Learning from Human Feedback (RLHF) was used to achieve responses like those of a human (OpenAI, 2022a). This technique enables it to generate coherent, understandable, and complete interactions, but it also leads to one of the most serious and challenging issues to address, which is hallucination. According to OpenAI (2022b), this phenomenon involves generating false or inaccurate information:

> *ChatGPT sometimes writes plausible-sounding but incorrect or nonsensical answers. Fixing this issue is challenging, as: (1) during RL training, there's currently no source of truth; (2) training the model to be more cautious causes it to decline questions that it can answer correctly; and (3) supervised training misleads the model because the ideal answer depends on what the model knows, rather than what the human demonstrator knows (OpenAI, 2022b)*

According to UNESCO (2023), every user of ChatGPT must ask themselves if: a) they are willing to receive erroneous information, b) if they are capable of verifying information, and c) if they are prepared to face ethical or legal issues in case false information is obtained. If the answer to any of the above is no, then resorting to ChatGPT is not safe. Indeed, this technology is prone to inventing data that sounds plausible instead of stating that it lacks information. For instance, when asked for the most relevant books or articles on a topic, its response often comprises a list of titles that do not exist. Therefore, in an educational setting, using ChatGPT as an information search tool is strongly discouraged. Instead, it is crucial to rely on primary sources and foster data verification skills (Santiago-Ruiz, 2022).

Artificial Intelligence and academic writing

The use of artificial intelligence and chatbots in education is not a new phenomenon (Chassignol et al., 2018; Chen et al., 2020; Wollny et al., 2021). However, with the emergence of ChatGPT and other LLMs, the number of preprints and academic articles exploring the effects of these technologies has skyrocketed (Khosravi et al., 2023). According to various studies (Dwivedi et al., 2023; Lo, 2023) ChatGPT holds potential benefits in the educational context, as it can provide support to teachers in learning assessment and the creation of instructional materials. Additionally, it can serve as a virtual tutor, collaborating with students in their learning process. Nevertheless, it is important to consider the issues that AI can bring, such as promoting academic dishonesty, biases, misinformation, lack of privacy, cybersecurity risks, or exacerbation of inequality (Holmes et al., 2022; Sebastian, 2023; Smith and Neupane, 2018; Tuomi, 2018; UNESCO, 2023).

One of the primary areas of interest lies in determining ChatGPT's true capability for academic text composition. Regarding essays, Herman (2022), a high school literature teacher (for students aged 16 to 18), believes that AI writes better than most of his students. On the other hand, Horsnell (2023) asked a university professor to evaluate a text without knowing it had been written by ChatGPT, and the professor assigned it a B- grade (80%). In a larger exploratory study (Best Universities, n.d.), blind evaluations were conducted on essays written by university students compared to those written by GPT-3. The grades for the former ranged from F (59%) to A (93%), while for the AI-written essays, they ranged from F (59%) to B- (80%). Undoubtedly, further research is needed, but current evidence suggests that while a university essay written entirely by AI may not achieve top grades, it can obtain reasonably good scores. It can be concluded that ChatGPT is not capable of replacing university-level human intelligence, but it is important to note that significant changes in how written works are evaluated and learning goals are set will be necessary. Another major area of concern centers around the surge in plagiarism and academic dishonesty (Jarrah et al., 2023). ChatGPT's ability to effortlessly generate complete essays, respond to exam questions, and address open-ended queries has prompted numerous researchers and educators to suggest that we may be witnessing the decline of the traditional essay and other analogous forms of written assessment, at least in their current usage (Cotton et al., 2023; Herman, 2022; Sharples, 2022). It is very difficult to distinguish between text written by a human and that produced by AI. Traditional plagiarism detectors are insufficient as AI-generated essays exhibit a high level of originality (Khalil and Er, 2023). Sharples (2022) explains that ChatGPT can be used as a detection tool, but with poor results. A better option is to use specific tools, both free and paid. Among the free ones are OpenAI's classifier (https://platform.openai.com/ai-text-classifier) and GPTZero (https://gptzero.me/). Among the paid options is Originality.ai (https://app.originality.ai). Additionally, there are detectors like Turnitin (https://www.turnitin.com), which is quite expensive and accessible primarily to institutions rather than individuals. Despite the increasing proliferation of detection tools, a review of their effectiveness concludes that the methods they employ are not adequate to address most existing threats and that this field requires further development (Crothers et al., 2023). Moreover, it has been demonstrated that these types of tools produce many false positives for non-English proficient writers (Liang et al., 2023). So, the use of these technologies is even more limited in universities like UPN, where writing is primarily in Spanish.

Perhaps ChatGPT has marked the end of the era of academic essays as we know them, but it also opens new possibilities where students can incorporate this technology into what is known as augmented intelligence or hybrid teams (Dwivedi et al., 2023; Qadir, 2022; Roose, 2023). In the near future, where there will be an increasing number of artificial intelligence tools available, formal education needs to develop skills that enable students to leverage AI. For instance, ChatGPT can be used as a virtual tutor, generating summaries or quizzes upon request. It is also useful as an assistant in finding relevant topics or ideas (Zhang et al., 2023). Moreover, it excels as a writing assistant and translator (Bishop, 2023; Herman, 2022; Kim, 2023). Its applications can be diverse, such as explaining, changing tone, enriching vocabulary, suggesting titles, improving structure,

identifying unconsidered themes, aiding writer's block, finding alternative ways to express an idea, and more.

The evidence regarding ChatGPT, and writing is still limited, but some studies are beginning to emerge. In a review conducted by Albadarin et al. (2023), only five empirical articles related to ChatGPT, and writing were identified. These studies were primarily conducted with populations from Asia and the Middle East. The findings indicated that scholars used ChatGPT to generate unique ideas and perspectives, to translate content into their native languages, to request modifications in linguistic tones or styles, and to improve grammar and spelling. Firaina & Sulisworo (2023) identified three primary functions of ChatGPT: as a source of information, for English translation, and as a personalized tutor. On the other hand, Vicente-Yagüe-Jara et al. (2023) observed a significant improvement in students' written productions following the use of ChatGPT, particularly in terms of fluency. Overall, these studies reveal that undergraduate students make varied and productive use of ChatGPT to enhance their academic writing. However, it is important to note that there is a lack of research on other populations, such as Latin American students.

METHODOLOGY

This research was conducted through a combination of participant observation and analysis of students' assignments. The observational component was carried out as part of active engagement in various academic settings, including the author's classroom sessions, consultations, and interactions with colleagues and students.

The students were enrolled in the Pedagogy and Educational Psychology bachelor's programs. Many of them are unmarried women who are fully dedicated to their studies, with a typical age of 22. However, some have already entered the job market and work as teachers. On the other hand, the UPN educators who participated in this research include both males and females, aged 50 or older, holding doctoral or master's degrees. They teach at both the undergraduate and graduate levels.

Convenience sampling was utilized, and the inclusion criteria were defined as follows: 1) participants had to be either students or teachers at UPN; 2) they needed to have been involved in a social interaction with the researcher related to the subject of ChatGPT between January and June 2023. The author informed the students that research was being conducted on ChatGPT and consent was obtained to analyze their assignments. Their participation was voluntary and would not impact their grades, either positively or negatively. They were requested to openly disclose the utilization of ChatGPT in their assignments, and, in certain instances, in-depth interviews were conducted. This research collected information from around 12 teachers and 40 students. Data analysis was conducted using thematic analysis techniques.

RESULTS

Two primary categories of analysis are examined. The first pertains to teachers' perceptions of ChatGPT, while the second focuses on how students employed this tool in the composition of their academic assignments.

Teachers' Conceptions of ChatGPT

Teachers' conceptions of ChatGPT can be divided into three main groups according to how they perceive it: a) those who believe it will not impact their teaching practices; b) those who view the use of this technology as a serious educational problem, and c) those who see ChatGPT as providing opportunities.

The first group consists of teachers who believe ChatGPT will not bring about any changes directly affecting them, and therefore think they won't need to alter their teaching practices. Notably, these teachers engage in research on academic literacy, language pedagogy, and are influenced by New Literacy Studies (Gee, 2015) and the narrative approach. Despite repeated requests from the author of this article, they declined to establish guidelines for ChatGPT usage or to analyze the potential problems and opportunities presented by this new technology. Some of their arguments were: "*It doesn't affect us because we work with the writing process*," "*I ask for drafts from them*" or "*They write about their life, so they can't plagiarize*." Paradoxically, these teachers seemed to recognize the enormous potential of ChatGPT: "*Share me the link*," or showed some signs of considering it a threat: "*But don't teach it to the students*." These teachers' conceptions of AI align with a profile previously identified by Padilla Partida (2018), reflecting an inability to recognize the changes new technologies are bringing. Undoubtedly, teachers in this group possess a deep understanding of language pedagogy and how texts are constructed, yet their vision blinds them to the transformations already occurring in their classrooms.

The second group is the largest and consists of teachers who consider ChatGPT a serious problem and believe it adds no educational value to their students: "*Writing a text is a formative process, so having someone else do it for you is senseless.*" These teachers have received some assignments completely created with ChatGPT and detect them when they suspect they are exceptionally written compared to the known writing abilities of certain students. They then proceed to interrogate the student, who eventually confesses. They point out that students don't even read what the chatbot produces: "*When I ask them about their work, they say I don't know, that's how it came*". These teachers are implementing ways to prevent the use of ChatGPT, though their strategies are not very effective. One of the most recurring approaches is having discussions with students, emphasizing that the misuse of technology could lead to a decline in their cognitive abilities. Others have started requesting assignments or essays to be handwritten to compel their students to write. Only one of the teachers was aware that detection tools exist, however, he had excessive confidence in their effectiveness. A notable event was that during a meeting to endorse the operational guidelines for a doctoral program, a faculty member proposed the implementation of a regulation that could result in the expulsion of students found using ChatGPT in their academic work. The author of this article argued that there are honest and innovative ways to leverage this technology. Ultimately, the professor's proposal was rejected, but it stands as evidence of a substantial resistance to generative AI. Overall, these teachers feel a sense of helplessness, frustration, and concern as they face a substantial transformation that they are unsure how to navigate.

The third group consists of teachers who hold a more favorable view of AI. Typically, these individuals are younger, currently enrolled at UPN, pursuing their degrees, or have recently graduated and are embarking on their teaching careers. They are ChatGPT users, giving them a clearer understanding of its capabilities and limitations. Their concern is not how to prevent the use of the chatbot but rather how to implement better ways to leverage it. They perceive augmented intelligence and prompt engineering as skills to be developed. They also highlight that their students use the chatbot poorly: "*They are clueless, they don't even know what to ask fo*r." Additionally, these teachers have started implementing assessment strategies: "*I ask them for a screenshot with the prompt they used.*" However, it is important to note that the development of new teaching and assessment strategies for ChatGPT is still in the very early stages.

Uses of ChatGPT in the University

Next, I provide a classification of the various ways the students utilized ChatGPT in the university context. The usage techniques are organized, as much as possible, from the most to the least frequent.

Source of Information

This is perhaps the most frequent use that students give to the chatbot: "*I guess using ChatGPT is best because it has a huge amount of information*." One teacher asserts that students are citing ChatGPT in their assignments. In other populations (Albadarin et al., 2023), researchers observed that students tend to fact-check information and acknowledge the limited precision of ChatGPT, taking into consideration factors that impact it, such as input specificity, topic complexity, or training data. However, when I showed UPN students how easily it could produce hallucinations, most of them grew concerned since it appeared they relied on it heavily for their assignments. Regrettably, only one student verified the response provided by ChatGPT: "*I asked about the main associations working on sexual health in Mexico, and it gave me various results. I checked them one by one and selected the ones that seemed most appropriate*". It is important to reiterate that using ChatGPT as a source of information is not advisable because it tends to produce false information. On the other hand, while citing transparently discloses the use of ChatGPT, which is positive, it does not address the fundamental issue: that ChatGPT is not a reliable source.

Text Production with Human Intervention

Another highly prevalent use is creating texts that students modify: "*I ask for something and then I fix and tweak it*". These works are characterized by most of the words being written by the AI, while the student contributes initial ideas and adjusts. Workflows can vary greatly, and the user can add citations, paraphrase, rearrange paragraphs, alter sentences, design better prompts, combine text from multiple prompts, etc. It doesn't even require crafting an elaborate prompt; instead, a brief text with the core ideas is given to ChatGPT, which then expands and enhances it. In one of the works examined, a student fully disclosed his use of ChatGPT. Alongside each final text segment, he included comments detailing the original ideas he had supplied to the AI. Surprisingly, with just a few lines of text, he managed to generate a three-page essay. This is clear evidence of how easily students can use AI to produce complete academic papers with minimal effort. This kind of work tends to be quite deficient because students often don't put in the effort to establish logical coherence, define the parts of the text, or develop solid arguments. It appears that they prioritize mere page-filling. Furthermore, it is common to come across multiple "conclusion" sections that are copied and pasted without modification.

Proofreading

In this case, the text is predominantly written by the human, and the AI adjusts. Students take care of information research, generating ideas, structure, arguments, etc., while the AI enhances aspects like punctuation, vocabulary, and spelling, similarly to what a human editor would do. The prompts they use are like the following: improve the wording. In my Methodological Design Seminar class, I suggested several students use this technique, and overall, good results were achieved. Using ChatGPT as a style corrector can help free up time to address deeper aspects like theoretical and methodological issues, bibliography research, result analysis, conclusion argumentation, and logical coherence.

The effectiveness of AI-driven style correction varies based on writing skills. With individuals who struggle to organize ideas or present clear arguments, the outcome is a much more readable and grammatically accurate text, but one that, fundamentally, might have issues with logical coherence. In contrast, with students who have well-structured logical texts but grapple with punctuation, spelling, and academic language, the results of the correction are excellent. Finally, with well-written students, the outcomes are not as satisfying. ChatGPT might change an expression to another without apparent justification, and it could even replace a clear expression with a lengthier and more convoluted one.

Virtual Tutoring

This occurs when a student uses ChatGPT as support for their learning, asking questions, requesting error identification, or explanations: "*I use it for studying, I ask it things that the teachers didn't clarify*". Despite being mentioned frequently in specialized literature, this is an infrequent use, mentioned by only two students.

Interview Transcription Correction

It is very common during qualitative research to conduct interviews that need to be transcribed for proper analysis. This is one of the more tedious processes for students and requires a significant time investment, often leading to error-laden transcriptions. Therefore, several students have started using ChatGPT with a prompt like: "*Correct punctuation and spelling, but do not change the words.*" This significantly expedited the transcription correction process and proved to be highly useful.

Translation to Spanish

ChatGPT produces translations of excellent quality, allowing students to access texts that would otherwise be completely inaccessible to them. I was able to verify the usefulness of this technique through several presentations of articles in English that my students translated using ChatGPT. Previously, using English bibliography was impossible because other tools left much to be desired. This is an excellent way to democratize knowledge predominantly written in English and that is challenging for students from Mexican public schools to access. However, this use is infrequent among students because they are unaware of sources for obtaining English papers and are unaware of which would be most useful for their needs. Additionally, several students do not know how to use ChatGPT for translation, despite the prompt is simple: "Translate the following text to Spanish."

Title Suggestions

Choosing a good title is difficult, so one student turned to ChatGPT with the following prompt: "*Give me title suggestions for a paper that has the following summary*." With this technique, she didn't arrive at a definitive title but used the result as a starting point to build it.

Translation to English

This is a less frequent use and is employed only in specific situations. An example of this case occurred with a student aiming to graduate by publishing a paper. She used ChatGPT to translate her abstract, keywords, and title into English. This allowed her to submit the paper to a Mexican-indexed journal that otherwise wouldn't have been accessible due to her lack of English proficiency. Among the most noteworthy findings of this research, it is worth mentioning that there exist varying viewpoints among educators regarding the efficacy of ChatGPT. While some advocate for students who use this tool to face expulsion, others view it as an opportunity, albeit without a clear strategy for leveraging it effectively. On the other hand, the most prevalent usage of ChatGPT among students is as an information source and for generating assignments, many of which go unread. Only a minority of students take the time to fact-check the information provided by ChatGPT or employ it in a more productive manner, such as for translation, virtual tutoring, transcribing interviews, or enhancing their writing skills.

CONCLUSIONS

In the first semester since the introduction of this technology, the experiences are bittersweet. Not all students have access to the Internet or a computer, which hinders their ability to benefit from AI. However, in an urban university like UPN, the challenge is less about access and more about proficiency. While some techniques, like translation, hold great promise and enable students to access knowledge previously beyond their reach, others could compromise the learning process. Students are unfamiliar with AI and unaware of its limitations, leading them to use it uncritically. Evidence of this is primarily seen in the use of ChatGPT for information retrieval, which, as previously mentioned, can yield erroneous results. Students often do not take a moment to verify or question the information they receive. Another prevalent use is for generating complete assignments, with just a few words being sufficient for them to create a work that they subsequently submit without even reviewing. This has serious consequences, as it results in students producing effortless, unpracticed, unimproved, and unlearned texts. Conversely, there are other uses that are more productive and beneficial, such as translation, style editing, personalized tutoring, and interview correction. However, very few students utilize these functions.

The basic usage of ChatGPT can be attributed to two primary factors: a deficiency in academic writing skills and a lack of AI proficiency. To effectively leverage ChatGPT for academic writing, students must be capable of identifying issues in their own texts, such as spelling, coherence, organization, argumentation, source selection, etc. Additionally, they need to provide specific prompts to address these issues. However, many students struggle to identify writing issues and have a limited understanding of how to use prompts effectively. For example, they are uncertain about how to request ChatGPT to function as a proofreader or translator.

Educators generally remain unaware of the existence of ChatGPT or struggle to foresee the transformations it will bring about, even as students are already incorporating ChatGPT into their study routines. This creates a significant disconnect between students and educators: the former employ it without the latter's knowledge, potentially undermining learning. ChatGPT is altering how studying, writing, and research are approached, making it imperative for educators to consider all of this to update their teaching practices. It is necessary to develop training plans so that educators can confront the transformations that are already emerging within their classrooms.

One of the challenges educators face today is detection. Undoubtedly, addressing new challenges related to academic dishonesty requires a multifaceted approach that encompasses both ethical principles and cyber tools. First and foremost, raising awareness campaigns are essential to educate students about new forms of dishonesty and plagiarism. Concurrently, universities should develop a regulatory framework for the use of AI, like what scientific journals are already doing. For instance, Nature (2023) does not prohibit its use but requests that its application be transparent in the methodology of published papers. Furthermore, reliable detection tools should be made available to educators, and proctoring software should be employed for online exams. Unfortunately, in the Mexican context, universities like UPN often lack access to proctoring software or efficient detection tools due to their cost. This situation increases the risk of ChatGPT being utilized for academic dishonesty.

In educational settings characterized by inequality, the utilization of tools such as ChatGPT can give rise to additional challenges. Students might confront issues associated with their proficiency in harnessing this technology. Consequently, it is imperative for higher education institutions to implement specific measures to address these issues. There is an immediate necessity for the creation of courses designed to instruct students on how to maximize the potential of this technology.

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