Information Sciences Letters
An International Journal

ChatGPT and the EFL Classroom: Supplement or Substitute in Saudi Arabia's Eastern Region

Mahdi A. Ahmed

Department of English Language, Jubail English Language and Preparatory Year Institute, Royal Commission for Jubail and Yanbu, Jubail, Saudi Arabia

Abstract: This paper compares EFL learners' satisfaction with teacher-mediated versus ChatGPT-assisted writing opportunities. Results show that, except for ease of use, learners reported greater satisfaction with the teacher's role in all other factors, with the construct of interactive opportunities in the teacher mediated period rated the highest contributor to learning satisfaction, while the component of learning content being reported to be 'almost satisfied' in teacher mediated mode. The study was based on 64 EFL learners' perceptions of learning satisfaction in teacher-mediated versus bot-created writing opportunities using factor analysis of data generated from responses to five open-ended questions at a language learning institution in the Eastern Region in Saudi Arabia. The data collection period was four weeks, and learners' responses were sought in an eight-item written interview which loaded onto four learning satisfaction components: Learning content, learning progress, ease of use, interactive opportunities. We suggest that ChatGPT can supplement the learning process but cannot replace the teacher's role without proper training for cautious use as ChatGPT does not help in students' progress due to the lack of learning satisfaction attained in the use of this tool.

1 Introduction

Artificial intelligence (AI) is one of the massive effective systems which supports online learning and teaching, including personalizing learning for students [1], relieving instructors of routine tasks such as marking attendance and assessment submissions, and powering adaptive assessments [2]. However, promising the advantages of AI may appear to be, it has negative impact on the culture, norms, and the interactions between learners and instructors which are still not as desired [3]. In online learning, learner–instructor interaction (including amongst other things, communication, support, and presence) has a deep impact on students' satisfaction and learning outcomes. ChatGPT, the latest AI tool by OpenAI is one of the hottest topics of debate in academic and other professional circles [4]. The concerns it has raised, and the almost shocking ease of use, are truly and equally profound. It has some massive advantages in enhancing educational techniques, but also some monumental possibilities for ethical violations [5]. At the same time, the Covid-19 generation of learners may find much solace in it.

The first substantial language model to be made available to the public was the GPT (Generative Pre-trained Transformer) model created by OpenAI in 2018 [6]. Through the use of human-like output, GPT was able to produce text that could read like human speech, respond to inquiries, and help with tasks like translation and summarization [7]. OpenAI eventually developed the GPT-2 and GPT-3 models, embellished with more sophisticated features, based on this original model. It may not be an exaggeration to state that the introduction of GPT was a critical turning point in the development of NLP and offered up a variety of channels for distribution in both academic and commercial settings. In this big step in machine-learning responsibility for learning and learner success fell into the grey area. For instance, Castelvecchi [8] showed that learners worried about responsibility concerns that could occur when AI's inaccurate and unexplained replies caused unwanted results, students could not examine whether the responses from an AI Teaching Assistant were correct or incorrect because of the AI system's black-box design. As a result, they may be unable to understand the reasoning behind an AI-generated response. Moreover, if students used machine-generated answers in their tests but teachers marked them as incorrect, major liability conflicts may arise [9]. Due to AI's unreliability, students would also have more room to contest their grades.

Even with the speed that AI tools like ChatGPT come armed with, higher order thinking skills still need to be applied

*Corresponding author e-mail: Mha1121@hotmail.com

before accepting any output [10]. In other words, to make the most of ChatGPT possibilities, one would need to have a solid foundation in the subject area. On the other hand, it may be effective in fields like econometrics where students must work with data a great deal. Thus, identifying how students and instructors perceive the impact of AI systems on their interaction is important to identify any gaps, challenges, or barriers preventing AI systems from achieving their intended potential and risking the safety of these interactions [11].

1.1 Previous studies

ChatGPT is a great value tool that undoubtedly aids learners and enhances some aspects of their productivity in the learning process, particularly in the more tedious parts [12]. It has the potential to provide students with practice and feedback in the language as an AI language model, but it is still questionable if ChatGPT could take the position of a human instructor in an EFL setting [13]. The reasons will occur even to novices in the field: Human teachers provide special abilities and traits to the classroom that AI cannot imitate, such as empathy, creativity, and cultural awareness, all of which are as much the components of language learning as grammar and syntax [14]. Teachers can also cater to each student's unique requirements and learning preferences by giving them individualized attention and support. Additionally, teaching involves more than just imparting knowledge and offering feedback [15]. It involves encouraging critical thinking and problem-solving abilities, building a love for learning, and establishing a supportive and interesting learning environment [16]. These are characteristics that AI cannot fully reproduce, at least not yet.

However, even in the infancy of ChatGPT, several studies have already explored such AI tools in new dimensions [17, 18]. Kasneci et al. [19] recently worked on investigating the role of ChatGPT in Large Language Models for Education. They looked at both opportunities and challenges in using the tool in EFL classrooms given the fact that the field of AI has advanced significantly with the development of large language models. Large language models are here to stay, despite opposition and even outright prohibitions within communities and regions, as the underlying technology is essential to further advancements, and this position paper discusses the potential benefits and challenges of educational applications of big language models from the viewpoints of students and teachers. Likewise, Bin-Hady et al. [20] explored the dimensions of ChatGPT in English language learning. Findings show that ChatGPT can be used in developing learners' language chops; scaffolding the literacy process by furnishing feedback to scholars on their language use and acting as mates in rehearsing the language with recommended conditioning for further language practice. The concept encourages future innovation and highlights diverse applications while involving a flexible instructor role to strengthen learner autonomy and deliver enjoyable learning. Teachers could give some instructions on how to use this new program effectively by looking at the AIALL model of ChatGPT for language learning.

Kumar and Thakur [21] noted that artificial neural networks, big data, cloud computing, and machine learning have all made it possible for engineers to build a machine that can mimic human intellect. Based on these innovations, this study refers to AI as the capacity of machines to detect, recognize, learn, respond, and solve problems. Future workplaces will undoubtedly undergo a revolution because of such intelligent technologies. According to Horakova et al. [22] despite the fact that AI can connect with people and boost human performance, it is quickly becoming the next disruptive innovation. Dai et al. [23] noted that AI is currently viewed by many as a driver that is integral to the fourth industrial revolution, and it may trigger the fourth revolution in education. Learning about AI has also begun to be part of school curriculum. However, in conjunction with current education reforms like the digitalization of educational resources, gamification, and personalized learning experiences, there are many opportunities for the development of AI applications. Loeckx [24] in 2016 suggested that AI could be an effective learning tool that lessens the burdens of both teachers and students and offers effective learning experiences for students. Zhai et al. [25] did a review of AI in Education from 2010 to 2020. To sum up the findings, this paper examined the research on AI in education. This review concentrated on AI tools and techniques that have recently been incorporated into education due to the proliferation of AI. Dai et al. [26] concluded with giving suggestions regarding promoting students' well-being by developing their readiness for the artificial intelligence age.

Previous studies have included three crucial perspectives of AI in knowledge processing: (a) knowledge representation, (b) knowledge obtaining, and (c) knowledge derivation. Zhai et al. [27] focused on these perspectives. The "first generation" of AI could assist human intellectual work by using rule-based expert knowledge, while the "second generation" may find the best solution using statistical or search models. The "third generation" of AI, on the other hand, will significantly boost recognition performance based on the brain model. This study evaluates the novel role of the teacher in an AI-enabled EFL classroom and how ChatGPT can be used as an educational tool period in learning English as a Foreign language. The purpose of this study was to analyze the content of studies that sought to reveal how artificial intelligence (AI) has been used in the field of education and to investigate future research directions and difficulties related to AI in education. A total of 100 papers, including 63 empirical papers (74 studies), and 37 analytical papers, were chosen from the Social Sciences Citation Index database's education and educational research category between 2010 and 2020. The text analysis revealed that the study issues could be divided into three categories: integration layer, application layer, and development layer (classification, matching, recommendation, and deep

learning). Additionally, an evaluation of four research trends, including the Internet of Things, swarm intelligence, deep learning, and neuroscience.

Many researchers investigated the role of Artificial Intelligence in the EFL learning process [28, 29, 30, 31, 32, 33, 34]. Many of these concluded that students that use CHATGPT for research run the risks of plagiarism, inauthenticity, and over-reliance on the model. Instead, it may be healthier for students to receive instruction on how to use language models responsibly with guidelines for assessing the validity and reliability of the data produced by the model in order to allay these worries. Teachers and lecturers should also be alert to these issues and advise students on how to use ChatGPT for their research projects. Students should get academic integrity instruction, and plagiarism detection tools can be used. In the related field of translation studies, In-seok and Bong-gyu [35] investigated if ChatGPT is an efficient translator or not, and how exactly it converts verbal data translation. Recently De Winter [36] investigated if ChatGPT can pass high school exams on English language comprehension, while Firat [37] discussed how ChatGPT can transform autodidactic experiences and open education. As per Chan [38] indicated the opportunities for AI are promising, students and instructors may perceive the impact of AI systems negatively (For example, students may perceive the behaviour of AI agents that do not take into account the risk of data bias or algorithmic bias as disconcerting. This study seeks to answer the following research question:

1. What are the Saudi EFL learners' perceptions on four factors (learning content, learning progress, ease of use, interactive opportunities) with respect to learning satisfaction in ChatGPT of writing skills in English?

2 Methodologies

2.1 Research design

A qualitative design was followed in this study. An interview was devised from the tools of Topala and Tomozii [39], and Fieger [40] and developed to measure Saudi EFL students' satisfaction on using ChatGPT. The study took place in the second semester of the Academic year (1444AH) in the Eastern Region, Saudi Arabia.

2.2 Sample

Two classes of freshman year of EFL at two colleges in the Eastern Region of Saudi Arabia were part of this study. Since the participants were recruited through the researcher's professional and acquaintance network, they constituted a convenience sample. The data collection took place in 1444 AH, which is the end semester of the year to ensure that the students had been through the writing instruction curriculum and well-prepared in writing skills. The intervention was planned mostly as a writing practice in fact-based academic writing in English. Even so, participation was completely voluntary but the opportunity to use ChatGPT in writing was one that saw one hundred percent participation from the classes selected. In all there were 64 learners who attended the four-week program with two weeks dedicated solely to teacher mediated and ChatGPT assistance for writing practice. The researcher met the group in two batches of 32 each thrice a week for an hour and helped them with immediate feedback on their academic writing. In the ChatGPT classes, however, though he was present with the participants, writing responsibility lay completely with them and the AI tool.

2.3 Instrument

The initial interview was developed based upon students' learning satisfaction questionnaires in Topala and Tomozii [41], and Fieger [42] with twenty items under five categories of factors. One category was removed after exploratory factor analysis as this loaded on to a pre-existing factor. Items with low factor loadings were similarly redacted and three items merged as they represented the same factor again. Internal consistency was verified with factors loadings computing to the range of 0.600.8 which represented acceptability of the items. In the final stage, the questions were validated by a panel of three senior trainers in EFL and two in AI. Minor changes were recommended which were duly incorporated. Responses to the interview questions were sought from the learners and although they were free to write as detailed responses as they wished, the researcher did instruct the participants to not stray from the centrality of the question. All responses were collected on the same day to rule out corruption or dilution of data. The questions and responses were all in English.

3 Results

What are the Saudi EFL learners' perceptions on four factors (learning content, learning progress, ease of use, interactive opportunities) with respect to learning satisfaction in ChatGPT versus teacher-mediated learning of writing skills in English?

Deep analysis of the responses to the questions revealed the following results vis-à-vis the four factors examined in this study:

i. **Learning content:** Table 1 shows that 30 of the participants reported that learning content was slightly better in teacher-mediated writing classes than when they used ChatGPT, leading to lower learning satisfaction in the latter. 25 participants reported that the immediate feedback that the teacher provided in activities involving in-class writing practice was missing in ChatGPT where neither feedback is needed nor provided as the writing is not even that of the participants. Six participants reported that they did not feel any sense of connection with the output, and they had not composed it, three reported that they did not go through the essays produced by ChatGPT as they believed that since AI had produced them, they would be perfect.

Table 1: Learning content in teacher mediated and ChatGPT

Alternative	Frequency
Learning content was slightly better in teacher-mediated writing classes than when they used ChatGPT	30
Feedback was missing in ChatGPT	25
Students did not feel any sense of connect with the output and they had	6
Students did not go through the essays produced by ChatGPT	3

ii. **Learning progress:** Table 2 indicates that 43 of the 64 participants reported not being satisfied with ChatGPT in their EFL writing class as it needed almost no input from their end, produced essays with great ease but their learning in the process was negligible, if any. Further, 21 participants opined that their learning progress is mostly achieved under their teacher mediation due to the satisfaction they feel.

Table 2: Learning progress in teacher mediated and ChatGPT

Alternative	Frequency
Dissatisfied with ChatGPT in their EFL writing class	43
Teacher mediator is big motivator for students' satisfaction	21

iii. **Ease of use:** Table 3 shows that 52 out of the 64 participants reported that the ChatGPT tool quickly generated their essays which would otherwise have taken them several hours of painstaking work, that is, they highly favored its use as far as ease was concerned. The keywords that indicated participants' interest in this feature were fast, easy, good words, convenient, good for scoring marks, and information retrieval. On the other hand, some even more interesting answers came from those 12 respondents who did not report in favor of the learning content gains in ChatGPT. Here is the most conspicuous of them: Since the essays were mostly fact-based, one participant had generated a write-up on the most well-known "living" writers in English from the Middle East region. To his utter dismay, three of the writers named in the essay were either recently or long deceased! Being an avid reader, this participant was well aware of this fact, but all ChatGPT users may not be so.

Table 3: Ease of use in teacher mediated and ChatGPT

Alternative	Frequency
ChatGPT tool quickly generated their essays	52
Students did not think that ChatGPT is easy to use	21

Yet another participant reported that he generated an essay on a famous musician, Billie Eilish but had to question the intelligence of the AI tool when it included false information in the essay. He brought this to the notice of the researcher who noted the very convincing tone of the statement which raised the question of how reliable information generated by ChatGPT can be, especially for the novice or less-informed learners.

iv. **Interactive opportunities:** Table 4 reports that 59 of the 64 participants strongly reported opportunities for interaction were most frequent and satisfying in the teacher-mediated writing class. 18 participants stated their aversion to AI tools in EFL writing as they had no means of internalizing language input as was possible in teacher-led classes. Three participants reported that given a choice, they would rather collaborate with their peers than AI for English writing. This factor was reported by the largest number of participants as being instrumental in learning satisfaction gains.

Table 4: Interactive opportunities in teacher mediated and ChatGPT

Alternative	Frequency
Interaction was most frequent and satisfying in the teacher-mediated writing class	59
Students' aversion to AI tools in EFL writing as they had no means of internalizing language input	18
Students would rather collaborate with their peers than AI for English writing	3

4 Discussions

The study found that ChatGPT does not provide satisfactory content for EFL learners in the writing course. Students reported that they missed the feedback which was usually provided immediately by their teachers in teacher mediated

learning. This finding is confirmed by Xia et al. [43] who concluded that Chabot is not beneficial for low level students. The study also argued that ChatGPT does not help students' progress due to the dissatisfaction they got in such learning. This finding diverges with Bozkurt et al. [44] who claimed that AI participates in many educational tasks which help in the progress of learners. Furthermore, the study indicated that ChatGPT is easy to use. Students can use it to get their tasks done. This easiness may not always be positive. For example, Chomsky [45] considers ChatGPT a source of plagiarism. Moreover, Loeckx [46] suggested that AI could be an effective learning tool that lessens the burdens of both teachers and students and offers effective learning experiences for the former. Finally, this investigation showed that teacher mediation is more interactive and provided more satisfaction for the learners. This finding can be justified by Castelvecchi [47] who claimed that learners worried about responsibility concerns that could occur when AI's inaccurate and unexplained replies caused unwanted results, students could not examine whether the responses from an AI Teaching Assistant were correct or incorrect because of the AI system's black-box design. Furthermore, Dai et al. [48] concluded with giving suggestions regarding promoting students' well-being by developing their readiness for the artificial intelligence age.

The study reached many interesting conclusions. Though ChatGPT does closely resemble (or imitate?) human writing, its reliability is doubtful as much as the bot's commitment to truth and facts. There is no doubt that having EFL learners formally use them is a big attraction in terms of engagement and entertainment. However, how much real language learning is possible with them is not yet certain, least of all, in developing teaching-learning materials as they do convey falsehoods as facts, and that too, in a very convincing manner. In other words, their ability to produce "knowledge" is doubtful.

Instead of reducing learning to a set of pre-packaged and uniform procedures that diminish student agency, AI technologies in online education can be used to improve human reasoning and advance the learning process. In reality, human facilitators like teachers or peers and AI systems will need to frequently work together to implement adaptive support [49]. In this situation, Baker [50] attempted to bring about agreement between humans and AI systems by fusing "intelligent humans and stupid tutoring systems." (p. 603). AI systems can swiftly process a lot of data, but they are still not equipped to handle complex situations, unlike humans who exhibit versatility and intelligence in several circumstances, though they cannot imitate AI systems in data processing.

Tasks requiring emotion, logic, specialist expertise, or up-to-date information are not well suited for ChatGPT. Earlier studies show that ChatGPT struggles even with arithmetic calculations or difficult mathematical calculations, showing that such models have not fully mastered logic. Furthermore, upgrading these substantial language models by merely replacing or updating entities is not possible, unlike updating knowledge bases [51, 52]. Since the majority of the training text in the current model is drawn from material that was made accessible to the public before 2021, such models are unable to produce reliable information in a timely manner. Although the ChatGPT platform has many uses for text production, outputs need to be carefully scrutinized before use because they could contain inaccurate, biased, or not updated. However, developing the sophisticated capabilities of the tool in the same way that computers and the internet have in the past, ChatGPT has the potential to make a big impact on how teaching is carried out. In the coming decade, it is probably going to be incorporated into a lot many classrooms but as a great supplement to the teaching-learning process.

5 Conclusions

To sum up, AI language tools can provide feedback on student work and evaluate their progress in several ways, can review writing and speaking assignments and provide corrections for grammar, vocabulary, and pronunciation errors. Tools like ChatGPT can provide suggestions for improvement, such as alternative word choices, sentence structures, and pronunciation techniques, but so can many other freely available software such as Scribbr and Duplichecker without the dangerous attributes of ChatGPT. It can be a great aid to teachers in doing mechanical tasks such as assigning grades and assignments to learners based on certain criteria like accuracy in grammar, how vocabulary is used, and the correctness of syntax. EFL teachers can look towards ChatGPT to enrich their classes with tasks based on it or as a learning assistant for the learners. But as far as learner engagement and motivation, classroom order, and choice of the most suitable strategies for the varied learners go, ChatGPT will need to take a backseat for now.

6 Recommendations and Limitations

ChatGPT has become a reality in our life. It is recommended that future research be conducted to focus on the implementation of ChatGPT in teaching language skills in the Arabic context. Future studies are also recommended to focus on using such applications in research. AI to the tune of ChatGPT -level is a new entrant in the field of education. Though the current study is likely a unique one in the Saudi EFL context, there have been some limitations. The process of learning has two main factors: Teachers and Learners. Any educational intervention or innovation needs to be

evaluated from the points of view of at least these two players. This was not possible here given the limited scope of the study. Further, gender differences may be possible in language and technology use. This factor needs to be examined deeply in future studies.

Conflicts of Interest Statement

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

References

[1]   K. Seo , J. Tang, I. Roll, S, Fels, & D ,Yoon. The impact of artificial intelligence on learner–instructor interaction in online learning. *International Journal of Educational Technology in Higher Education, 18, 1-23,*(2021). DOI: 10.1186/s41239-021-00292-9

[2]   W. Yin. An artificial intelligent virtual reality interactive model for distance education. *Journal of Mathematics,* 1-7,(2022).

[3]   N. Chomsky. *Advances in AI: ChatGPT & human brain,*(2023) Available on YouTube https://www.youtube.com/Youtube.com/watch?v=-NMR5JXp37k

[4]   W. Bin-Hady, A.K., Abdu, H.Abduljalil, & J. Ali. Exploring the dimensions of ChatGPT in English language learning: a global perspective. *Library of High Tech*, (2023). DOI.10.13140/RG.2.2.30549.50406.

[5]   N. Chomsky. *Advances in AI: ChatGPT & human brai*(2023) Available on YouTube https://www.youtube.com/Youtube.com/watch?v=-NMR5JXp37k

[6]   A, Radford, K. Narasimhan, T.Salimans & I. Sutskever*, Improving language understanding by generative pre-training,* (2018). https://www.cs.ubc.ca/~amuham01/LING530/papers/radford2018improving.pdf

[7]   B. D., Lund, & T.Wang. *Chatting about ChatGPT: how may AI and GPT impact academia and libraries?.* Library Hi Tech News, (2023).

[8]   D. Castelvecchi. Can we open the black box of AI? *Nature, 538*, 20-23,(2016). Doi:10.1038/538020a.

[9]   J. D. Novak. Meaningful learning: The essential factor for conceptual change in limited or inappropriate propositional hierarchies leading to empowerment of learners. *Science Education, 86(4)*, 548-571,(2002).

[10]   M. Halaweh. ChatGPT in education: Strategies for responsible implementation. *Contemporary Educational Technology, 15(2),* (2023), ep421.Doi:10.30935/cedtech/13036

[11]   K. Crawford and R. Calo There is a blind spot in AI research. *Nature, 53(8)*,311–313(2016). https://doi.org/10.1038/538311a

[12]   A. S. Georgeand A. H. George. A review of ChatGPT AI's impact on several business sectors. *Partners Universal International Innovation Journal, 1(1),* 9-23,(2023). Doi:10.5281/zenodo.7644359

[13]   E. Kasneci, K.Seßler, S. Küchemann, M., Bannert, D. Dementieva, F. Fischer, , ... and G. Kasneci. ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences, 103*, (2023). Doi:10.1016/j.lindif.2023.102274

[14]   W. Littlewood. *Foreign and second language learning: Language acquisition research and its implications for the classroom.* Cambridge university press,(1984).

[15]   S. Friesen and D, Scott,. Inquiry-based learning: A review of the research literature. *Alberta Ministry of Education, 32*, 1-32,(2013).

[16]   A. S. Rahmatullah, E. Mulyasa, S. Syahrani, F, Pongpalilu, and R. E. Putri,. Digital era 4.0: The contribution to education and student psychology. *Linguistics and Culture Review, 6(S3)*, 89-107(2022).

[17]   W. Bin-Hady, A.K., Abdu, H.Abduljalil, & J. Ali. Exploring the dimensions of ChatGPT in English language learning: a global perspective. *Library of High Tech*, (2023). DOI.10.13140/RG.2.2.30549.50406.

[18]   E. Kasneci, K.Seßler, S. Küchemann, M., Bannert, D. Dementieva, F. Fischer, , ... and G. Kasneci. ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual

Differences, 103, (2023). Doi:10.1016/j.lindif.2023.102274

[19] E. Kasneci, K.Seßler, S. Küchemann, M., Bannert, D. Dementieva, F. Fischer, , ... and G. Kasneci. ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences, 103, (2023). Doi:10.1016/j.lindif.2023.102274

[20] W. Bin-Hady, A.K., Abdu, H.Abduljalil, & J. Ali. Exploring the dimensions of ChatGPT in English language learning: a global perspective. *Library of High Tech*, (2023). DOI.10.13140/RG.2.2.30549.50406.

[21] K. Kumar and G. S. M Tahkur. Advanced applications of neural networks and artificial intelligence: A review. *International Journal of Information Technology and Computer Science, 4***(6)**, 57–68,(2012).

[22] T. Horakova, M. Houska, and L. Domeova. Classification of the educational texts styles with the methods of artificial intelligence. *Journal of Baltic Science Education,16***(3)**, 324–336,(2017).

[23] Y. Dai, C.S. Chai, P.Y, Lin, M.S.Y.Jong, Y.Guo and J. Qin. Promoting students' well-being by developing their readiness for the artificial intelligence age. *Sustainability 12*, 6597,(2020). Doi:10.3390/su12166597

[24] J. Loeckx,. Blurring boundaries in education: context and impact of MOOCs. *International Review of Research in Open and Distributed Learning, 17***(3)**, 92–121,(2016).

[25] X. Zhai, X. Chu, C.S., Chai, M. S. Y. Jong, A.Istenic, M. Spector, J. B. Liu, J. Yuan and Y. Li. A review of artificial intelligence (AI) in education from 2010 to 2020. *Complexity*,1-18,(2021). Doi: 10.1155/2021/8812542.

[26] Y. Dai, C.S. Chai, P.Y, Lin, M.S.Y.Jong, Y.Guo and J. Qin. Promoting students' well-being by developing their readiness for the artificial intelligence age. *Sustainability 12*,(2020). Doi:10.3390/su12166597

[27] X. Zhai, X. Chu, C.S., Chai, M. S. Y. Jong, A.Istenic, M. Spector, J. B. Liu, J. Yuan and Y. Li. A review of artificial intelligence (AI) in education from 2010 to 2020. *Complexity*,1-18, (2021). Doi: 10.1155/2021/8812542.

[28] J. K. M Ali, M. A. A.Shamsan, T. A. Hezam and A. A. Q Mohammed. Impact of ChatGPT on learning motivation: teachers and students' voices. *Journal of English Studies in Arabia Felix, 2***(1)**, 41–49,(2023). https://doi.org/10.56540/jesaf.v2i1.51

[29] T. Horakova, M. Houska, and L. Domeova. Classification of the educational texts styles with the methods of artificial intelligence. *Journal of Baltic Science Education,16***(3)**, 324–336,(2017).

[30] W. Jiao, W. Wang, J. Huang, X. Wang and Z. Tu. *Is ChatGPT a Good Translator? A preliminary study. Computation and Language (cs.CL)*, (2023). Doi:10.48550/arXiv.2301.08745

[31] J.Knox. Artificial intelligence and education in China. *Learning, Media and Technology, 45***(3)**, 1–14(2020).

[32] R. Luckin. Towards artificial intelligence-based assessment systems. *Nature Human Behaviour,1*(3),1–3, (2017). Doi: 10.1038/s41562-016-0028

[33] M. Chassignol, A. Khoroshavin, A. Klimova and A. Bilyatdinova,. Artificial intelligence trends in education: A narrative overview. *Procedia Computer Science, 136*, 16–24(2018).

[34] R.F. Murphy. Artificial intelligence applications to support K–12 teachers and teaching. *RAND Corporation*, (2019). Doi:10.7249/PE315.

[35] K. In-seok and K. Bong-gyu,. Changes in English learning through interactive artificial intelligence in accordance with the 4th industrial revolution. *English Language and Literature 21*, *32***(1)**, 119-138, (2019).Doi:10.35771/engdoi.2019.32.1.006

[36] J. C. F. De Winter. *Can ChatGPT pass high school exams on English language comprehension?* (2023) Doi:10.13140/RG.2.2.24094.20807

[37] M. Firat. *How ChatGPT can transform autodidactic experiences and open education*? (2023). Doi:10.31219/osf.io/9ge8m

[38] R. Chan. The Cambridge Analytica whistle-blower explains how the firm used Facebook data to sway elections. *Business Insider*, (2019). www.businessinsider.com/cambridge-analytica-whistleblower-

[39] I. Topala and S. Tomozii. learning satisfaction: validity and reliability testing for students' learning satisfaction questionnaire (SLSQ). Procedia - Social and Behavioral Sciences, 128, 380-386, (2014) Doi:10.1016/j.sbspro.2014.03.175.

[40] P. Fieger. *Measuring student satisfaction from the student outcomes survey. technical paper.* National Centre for

Vocational Education Research Ltd, (2012).

[41] I. Topala and S. Tomozii. learning satisfaction: validity and reliability testing for students' learning satisfaction questionnaire (SLSQ). Procedia - Social and Behavioral Sciences, 128, 380-386, (2014) Doi:10.1016/j.sbspro.2014.03.175.

[42] P. Fieger. *Measuring student satisfaction from the student outcomes survey. technical paper.* National Centre for Vocational Education Research Ltd, (2012).

[43] Q. Xia, T. K., Chiu, C. S., Chai, and K. Xie. The mediating effects of needs satisfaction on the relationships between prior knowledge and self-regulated learning through artificial intelligence *Chabot. British Journal of Educational Technology*(2023). Doi:10.1111/bjet.13305

[44] A. Bozkurt, J. Xiao, S. Lambert, A. Pazurek, H. Crompton, S. Koseoglu ... and P. Jandrić. Speculative futures on chatgpt and generative artificial intelligence (AI): A Collective reflection from the educational landscape. *Asian Journal of Distance Education*, (2023). http://www.asianjde.com/ojs/index.php/AsianJDE/article/view/709

[45] N. Chomsky. *Advances in AI: ChatGPT & human brai*n(2023) Available on YouTube https://www.youtube.com/Youtube.com/watch?v=-NMR5JXp37k

[46] J. Loeckx,. Blurring boundaries in education: context and impact of MOOCs. *International Review of Research in Open and Distributed Learning, 17***(3)**, 92–121,(2016).

[47]   D. Castelvecchi. Can we open the black box of AI? *Nature, 538*, 20-23(2016). Doi:10.1038/538020a.

[48] Y. Dai, C.S. Chai, P.Y, Lin, M.S.Y.Jong, Y.Guo and J. Qin. Promoting students' well-being by developing their readiness for the artificial intelligence age. *Sustainability 12*, 6597,(2020). Doi:10.3390/su12166597

[49] K. Holstein and V. Aleven. Designing for human–AI complementarity in K-12 education. *AI Magazine* (2022)

[50] R. S. Baker,. Stupid Tutoring Systems, Intelligent Humans. International *Journal of Artificial Intelligence in Education, 26***(2)**, 600–614(2016). Doi:10.1007/s40593-016-0105-0.

[51] A. A. M. H. Al-Ahdal. EBook interaction logs as a tool in predicting learner performance in reading. Asiatic: *IIUM Journal of English Language and Literature, 14*(1), 174-188, (2020).

[52]   E.C. Opara. *ChatGPT for teaching, learning and research: prospects and challenges*, (2023). https://doi.org/10.13140/RG.2.2.21304.42244/1