

Game of algorithms: ChatGPT implications for the future of tourism education and research

Stanislav Ivanov and Mohammad Soliman

Stanislav Ivanov is based at the Varna University of Management, Varna, Bulgaria and Zangador Research Institute, Varna, Bulgaria.

Mohammad Soliman is based at the University of Technology and Applied Sciences, Salalah, Oman and Fayoum University, Fayoum, Egypt.

Abstract

Purpose – *The paper aims to evaluate the ways ChatGPT is going to disrupt tourism education and research.*

Design/methodology/approach – *This is a conceptual paper.*

Findings – *ChatGPT has the potential to revolutionize tourism education and research because it can do what students and researchers should do, namely, generate text (assignments and research papers). Universities will need to reevaluate their teaching and assessment strategies and incorporate generative language models in teaching. Publishers will need to be more receptive toward manuscripts that are partially generated by artificial intelligence. In the future, digital teachers and research assistants will take over many of the cognitive tasks of tourism educators and researchers.*

Originality/value – *To the authors' best knowledge, this is one of the first academic papers that investigates the implications of ChatGPT to tourism education and research.*

Keywords *ChatGPT, Tourism education, Tourism research, Intelligent automation, Large language models*

Paper type *Viewpoint*

1. Introduction

ChatGPT was developed by the San Francisco-based OpenAI, a tech and research company, and made freely available at the end of November 2022 (Vanian, 2022). ChatGPT is a well-known generative artificial intelligence (AI) platform or application using the most recent version of GPT-4 (Generative Pretrained Transformer 4). According to Stokel-Walker (2023), ChatGPT can be described as a large language model (LLM) that creates convincing phrases by imitating the linguistic statistical patterns seen in a sizable body of literature gathered from the internet. With its ability to respond to a variety of themes and subjects, ChatGPT could be a helpful tool for chatbots, academia, customer support and a variety of other applications (Gilson *et al.*, 2023). Consequently, the platform has gained a lot of attention from early adopters (e.g. students and scholars) and has even been termed a disruptive technology in a number of sectors (Haque *et al.*, 2022), including academia and education. Once ChatGPT debuted, users were amazed at how it could generate material such as short stories and dialogs based on the user's simple instructions (Topsakal and Topsakal, 2022).

ChatGPT has a disruptive effect on the entire educational system and scientific research. Since its release, it has been utilized at numerous universities and colleges to write summaries, essays and even full theses, raising concerns about the validity of these works and the worth of academic degrees. In this regard, it starts to generate big concerns about the future of education and research among different disciplines and areas, involving tourism and hospitality. The main concern is associated with some aspects such as essay and assignment writing as well as the

Received 12 February 2023
Revised 14 February 2023
Accepted 15 February 2023

© Stanislav Ivanov and Mohammad Soliman. Published in *Journal of Tourism Futures*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licenses/by/4.0/legalcode>

quality and quantity of academic research (Stokel-Walker, 2023). On the other hand, ChatGPT has a number of advantages for education and research (e.g. Anders, 2022a) such as better equity as all students and/or researchers have more access to aid, personalization, critical thinking skills development (if the app is utilized properly), development of teacher and student AI literacy, and motivational enhancement. In addition, the world-sweeping ChatGPT has made its official debut in the scientific literature, earning at least four authorship credits on preprints and published works. The appropriateness of citing the ChatGPT as an author and the presence of such AI tools in the published literature are currently topics of discussion among journal editors, academics and publishers (Stokel-Walker, 2023). In this context, the current viewpoint looks at the implications of ChatGPT and the future similar LLM-based chatbots for tourism education and research.

2. ChatGPT implications for tourism education

ChatGPT can be used as an effective tool in teaching and learning due to its ability to reject inappropriate requests, challenge inaccurate responses and keep track of what the user stated previously in the chat for follow-up queries. It communicates with the users in natural language, does not require coding skills and its interface is extremely easy to use (Haque *et al.*, 2022). Thus, its incorporation in tourism and hospitality programs can be implemented without significant hurdles. Additionally, ChatGPT offers explanations, solutions and responses to challenging topics, including possible approaches to develop code, address optimization requests and resolve layout issues (Haque *et al.*, 2022). In their study, Gilson *et al.* (2023) exhibited ChatGPT's capacity to offer justification and background data for the vast majority of answers, presenting a strong argument and justification for ChatGPT's potential use in medical education. Consequently, there are some practical guidelines and implications (see Anders, 2022a) to adopt ChatGPT in tourism education. For instructors, ChatGPT can serve as a virtual teaching assistant by giving students immediate feedback on a specific task. In addition, it can help them in preparing several exams and quiz versions, student learning assessments, syllabi, rubrics and so forth. Moreover, the application can be utilized as an assessor for students' assignments and other virtual tasks. For students, ChatGPT can be used to ask questions to get clarification on a particular piece of the course material or to have explanations repeated or given in a different and new manner. In addition, if the app can swiftly produce a passable response to a prompt or assignment, students will be able to use their skills and knowledge more effectively to do the task (e.g. Anders, 2022b).

There are some disadvantages of ChatGPT for tourism and hospitality education. First, the algorithm is trained with data up to 2021 and does not have access to real-time data. Hence, the answers it provides might be irrelevant, incorrect or simply outdated. Second, it might lack information about a particular query at all. Third, it does not provide references to the original sources of the texts used to generate the answer. Fourth, the authors' experience with the tool shows that its answers are usually descriptive and lack sufficient depth and critical analysis. Therefore, students and lecturers should not put too much trust in the texts ChatGPT generates but rely on their expertise, other (academic) sources and common sense.

ChatGPT's capabilities in generating text challenge the assessment modes. A few universities have publicly announced any policy toward the application, but those who have done it explicitly forbid its use. Naturally, exceptions do exist because while ChatGPT can write students' assignments and deprive them of learning some skills which they would have otherwise learned if they had written the assignments by themselves, ChatGPT allows students to gain other skills, especially digital skills that are vital for the tourism industry (Carlisle *et al.*, 2021). For example, students need to break down their assignments into prompts for which ChatGPT can write 100–300 words of relevant text. Therefore, an assignment of about 3,000 words would be generated by over 20 prompts. By using ChatGPT in their assignments, students learn how to operationalize tasks and give precise instructions, that is, their planning and communication skills might increase. Of course, at this early stage of development and adoption of ChatGPT in education, it is difficult to speculate about the impacts of ChatGPT on assessments. In order to gain data and make an informed decision about the use of ChatGPT by students, Varna University of Management, Bulgaria, for

example, is testing its contribution to the learning experience of students and is currently allowing them to use it for writing assignments in a couple of modules only as long as the use of the application is explicitly stated in the assignment. The insights gained from this experiment will inform the future policy of the university toward the adoption of ChatGPT and similar tools by students. Other higher education institutions incorporate ChatGPT in their curricula as well and ask students to use the application in order to learn about the capabilities of AI.

3. ChatGPT implications for tourism research

ChatGPT, in contrast to earlier chatbots, generates text automatically from typed inputs (Vanian, 2022). As a result, users (i.e. researchers) can input text instructions into the platform, and it will return text responses. To this end, scholars in tourism and hospitality can adopt this platform while conducting their scientific research.

First, tourism researchers can use it to generate research ideas. As ChatGPT is trained on a vast amount of data from multiple disciplines, its output as research ideas could go beyond the narrow perspectives of individual researchers and inspire new studies.

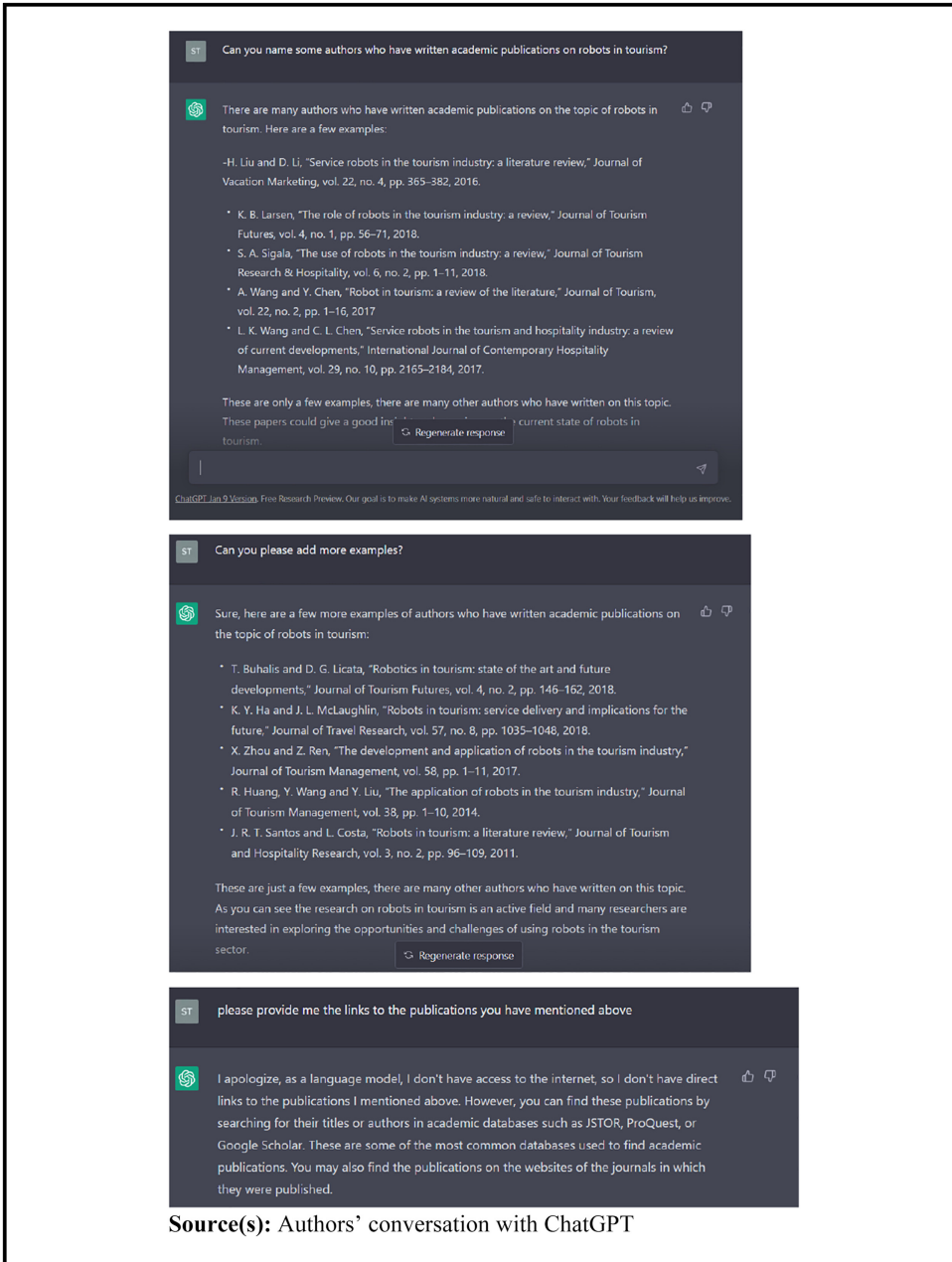
Second, it can be used by tourism researchers to write and review certain literature on a specific subject, formulate and develop hypotheses or advance the theoretical underpinnings of a certain discipline. Despite the application's ability to gather significant and relevant information, however, in such cases, it can be argued that ChatGPT has advanced to the point where it is able to deceive academics by producing scientific studies that are indistinguishable from authentic publications. In addition, some users assert that one of the main challenges to utilizing the platform professionally is citation issue. In this regard, Gao *et al.* (2022) emphasized that while ChatGPT is capable of producing more correct information, its accuracy and integrity when used in scientific writing are unclear. In their work using the application, Gao *et al.* (2022) indicated that even though its scientific abstracts are entirely made up of generated data, ChatGPT writes them convincingly. Moreover, although there was no evidence of plagiarism, these were original, but they were frequently recognized by human reviewers who were dubious, and by an AI output detector. Moreover, ChatGPT can make up nonexistent sources. For instance, when asked by the authors of this viewpoint to provide references on robots in tourism, ChatGPT hallucinated and delivered the following made-up sources (see Figure 1), none of which actually exists. When asked to provide the links to the sources, ChatGPT redirected the authors to the academic databases.

Third, ChatGPT could provide advice about the use of advanced statistical analysis or a particular methodology. It can also help researchers generate questions and respective scales to be included in questionnaires (see Figure 2). In that way, the application can be very useful to researchers because it will not only give them methodological ideas and insights, but it will save time as well. The lack of references, though, is a significant issue because there is no transparency about where the questions and scales come from, something that is a must in academic papers.

Fourth, ChatGPT could reword texts and improve the writing style. This is especially beneficial to tourism and hospitality researchers who are not native English speakers. Naturally, caution is needed because the AI may produce texts with repeating patterns that, although grammatically correct, might be quite boring to readers.

A major issue related to the use of ChatGPT in scientific research is the authorship and ethical considerations. Some researchers who are using ChatGPT to help write scientific publications even include it as a co-author (e.g. Ali and OpenAI, 2023), while the majority of authors do not do so (e.g. Iskender, 2023). Since AI platforms (e.g. ChatGPT) cannot be held accountable for the integrity and content of scientific publications, publishers agree that they do not meet the requirements for research authors. Some publishers, however, assert that acknowledging an AI's role in helping to write a paper in places other than the author list is acceptable (see Stokel-Walker, 2023). Similar to other tools, such as statistical software, the use of AI needs to be mentioned in the methodology section of the paper. Some publishers may also require a dedicated explicit

Figure 1 Conversation with ChatGPT about references on the topic of “robots in tourism”

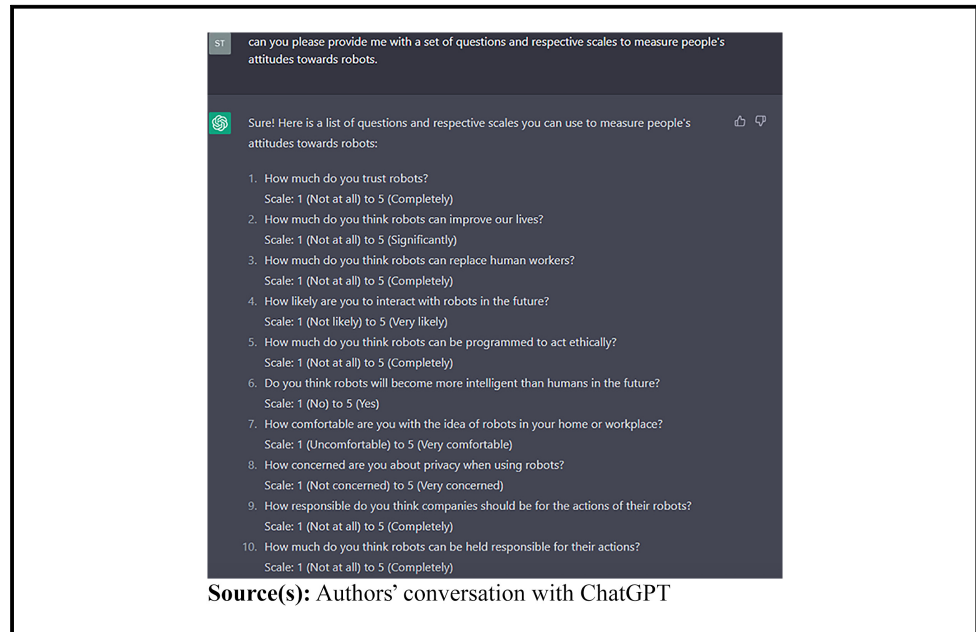


declaration about the use of AI in generating the text of the manuscript similar to the declarations on funding and conflict of interests.

4. Tourism 2030 and large language models: the rise of the digital teachers and research assistants

Thanks to ChatGPT, tourism educators and researchers have started to experience the power of LLMs. Considering the different arguments concerning the impact of using ChatGPT in tourism education and research elaborated in the previous section, the following question is raised: How will large LLMs reshape tourism education and research in the future?

Figure 2 ChatGPT generated questions to measure the attitudes toward robots



LLM-based chatbots, including ChatGPT, will transform tourism education and research in the long run. If they are applied skillfully and efficiently, they can be effectively used as digital instructors, curriculum creators, assessors/markers and writers of academic publications. In addition, LLMs will play a crucial role in redesigning tourism education from “teacher-student” interactions to “teacher-AI-student” co-creation and will shift the focus of human educators on creating innovative tasks and activities.

In the context of tourism education, chatbots and voicebots with integrated LLMs might be adopted as digital teachers to give students more engaging and efficient learning experiences and outcomes. Unlike human lecturers, they can repeat and reword the texts they generate as many times as necessary without complaints. In this vein, tourism-related digital teachers can be built to engage with students and deliver individualized and interactive lectures or classes on a range of themes and subjects within the field. Due to their ability to be taught in a variety of languages, these digital teachers will be qualified to teach tourism to students of different nationalities and origins. In addition, they will be able to evaluate written submissions and offer guidance on language use, grammar and style, leading to assisting students in developing their academic writing skills. LLM-based digital teachers can also make learning more accessible and provide valuable information for students concerning their tasks and research-based activities. Also, digital teachers would be able to grade tests, assignments and other course assessments, giving students prompt and precise results. Thus, the likelihood of human bias can be diminished and assessment fairness can be enhanced, although it will not be completely eliminated due to biases in the algorithm and training data set, for example (see [Ivanov and Umbrello, 2021](#)). This might eventually improve the efficiency and effectiveness of assessments and give students more individualized and insightful feedback by utilizing LLM-based digital teachers as assessors or markers in tourism education (wouldn't this be fantastic?).

For tourism educators, LLM-based chatbots would be used to automatically develop up-to-date and high-quality draft educational content and materials, such as interactive assessments, examinations and course outline plans, which will be further improved by the human lecturers if needed. Additionally, they will provide personalized tourism-linked curricula based on the needs and interests of each student; instructors can assess student progress and achievement and

modify the classes as necessary to create a more individualized and productive learning environment. While LLM-based digital teachers can accurately grade some tests, it is crucial to keep in mind that for more complex or innovative activities, humans will still be required. Therefore, the rumors that they will go extinct (Ivanov, 2016) might be exaggerated. The digital teachers would support the human lecturers and will lead to “human lecturer-AI-student” co-creation of educational experience and value.

With regard to tourism scientific research, LLM-based digital research assistants will be capable of writing research papers (see, for example, the first academic book written by an AI, Writer, 2019). They will support tourism researchers in writing the draft literature reviews, provide justification on methodology, prepare tables and charts and so forth. This means that the coming years will witness a great evolution in the number of research publications on tourism. Consequently, the body of knowledge and literature on new trends and themes in tourism will be reinforced. However, although LLMs are capable of producing good academic writing, it is crucial to consider that human authors will still be required in the future to revise and assess the work for originality, style and overall quality.

5. Conclusion

ChatGPT is only the forerunner of the AI tsunami that is going to hit tourism education and research in the coming decade. Although there are many AI systems, virtual assistants and chatbots, none of them have been as efficient or user-friendly as ChatGPT (Adamopoulou and Moussiades, 2020). It is a major disruptor in education and research. Higher education institutions and researchers need to adapt and embrace AI because it will not be the AI that will replace lecturers and researchers but lecturers and researchers who actively use AI will replace lecturers and researchers who do not use AI. In that sense, ChatGPT and other LLM-based chatbots will be enhancing rather than replacing tourism educators and researchers and will transform their work making it easier, more inspiring and intellectually challenging. In the long term, tourism educators’ work and life satisfaction would improve.

In practical terms, to harvest the benefits of ChatGPT, universities need to acknowledge the reality and allow students and lecturers to use it rather than go against the stream. Tourism and hospitality programs have already started to include robotics in their curricula in one way or another (Murphy *et al.*, 2017); now they will need to adjust ChatGPT and generative language models. Student assessments need to be revised in several directions. Some assignments might be focused on the application of ChatGPT and other language models in a tourism context in order to help students improve their digital skills. Other non-AI-focused assignments could be less generic and more specific, case-study based and require more critical appraisal rather than description. This will allow educators to evaluate what is really important to students and their employability (critical thinking and application of theory into business practice) while leaving AI to deal with repetitive and generic tasks. Policies and courses for students and educators on the ethical and responsible use of AI are needed.

Academic journals in tourism and hospitality need to face a new reality as well. Their publishers and editors have to acknowledge that parts of the texts in the manuscripts can be generated by AI (see, for example, Ivanov, 2021). They need to accept the fact that ChatGPT and other LLM-based chatbots are tools like any other tool that researchers use – sophisticated but yet tools. The fact that the AI-generated text which the researcher used in his/her publication does not remove the researcher’s responsibility for the content of that same text. Of course, the use of AI for text generation needs to be duly acknowledged in the manuscript as relevant.

6. Future research directions

The aforementioned issues concerning the use of ChatGPT in education and research lead to various directions for future work on the subject within the tourism context. To begin with, future

research is needed to determine how tourism and hospitality higher education institutions are addressing issues with the consequences of ChatGPT on education and research integrity, as well as the scope of such issues. In this respect, a qualitative approach can be applied using interviews with concerned stakeholders (e.g. students, instructors and policymakers). Moreover, assessing the impact of using this platform on academic integrity and achievement could be an outstanding avenue for further work. In addition, despite its usage in some disciplines, tourism and hospitality researchers are yet to utilize ChatGPT and similar tools. Thus, future studies are recommended to explore the attitudes and intentions of tourism students and researchers toward the adoption and usage of this application in their academic work. In this vein, scholars can use some relevant theories such as the technology acceptance model (TAM) (Venkatesh and Davis, 2000), the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980), the theory of planned behavior (TPB) (Ajzen, 1991, 2002), the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003) or extend or combine such models since they are frequently used to predict adoption behavior when studying the actual or intended adoption of technology (e.g. ChatGPT) in tourism (Abou-Shouk and Soliman, 2021). Research can also delve into the factors why some organizations (higher education institutions, publishers) allow the use of ChatGPT by students, lecturers and researchers, while others do not. Research can also focus on stakeholders' perceptions of the impacts of ChatGPT and other LLM-based chatbots on tourism education and research – What are the boundaries of what stakeholders consider as ethical, acceptable and fair use of AI? In that context, research will enter into the domain of AI ethics (Coeckelbergh, 2020). Moreover, future studies could critically analyze the content and value of the academic work that has used ChatGPT. This can provide an in-depth understanding and critical arguments concerning the benefits and drawbacks of adopting such an application in tourism education and research-related work.

The future of tourism research and education is unwritten. But will it be actually written by artificial intelligence? The most likely answer seems to be: Yes!

References

- Abou-Shouk, M. and Soliman, M. (2021), "The impact of gamification adoption intention on brand awareness and loyalty in tourism: the mediating effect of customer engagement", *Journal of Destination Marketing and Management*, Vol. 20, 100559.
- Adamopoulou, E. and Moussiades, L. (2020), "An overview of chatbot technology", in *Proceedings of the 16th IFIP WG 12.5 International Conference Artificial Intelligence Applications and Innovations: AIAI 2020*, Neos Marmaras, Part II 16, June 5-7, 2020, pp.373-383, Springer International Publishing, Cham.
- Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.
- Ajzen, I. (2002), "Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior", *Journal of Applied Social Psychology*, Vol. 32 No. 4, pp. 665-683.
- Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, NJ.
- Ali, F. and OpenAI, Inc, C. (2023), "Let the devil speak for itself: should ChatGPT be allowed or banned in hospitality and tourism schools?", *Journal of Global Hospitality and Tourism*, Vol. 2 No. 1, pp. 1-6, doi: [10.5038/2771-5957.2.1.1016](https://doi.org/10.5038/2771-5957.2.1.1016).
- Anders, B.A. (2022a), "ChatGPT (AI) in education – an overview", American University of Armenia, available at: <https://drive.google.com/file/d/1fTtmGz2Cp2nd65mNfQzPyo3beWXc9j9m/view> (accessed 10 February 2023).
- Anders, B.A. (2022b), "Why ChatGPT is such a big deal for education", available at: <https://scalar.usc.edu/works/c2c-digital-magazine-fall-2022-winter-2023/why-chatgpt-is-bigdeal-education> (accessed 10 February 2023).
- Carlisle, S., Ivanov, S. and Dijkmans, C. (2021), "The digital skills divide: evidence from the European tourism industry", *Journal of Tourism Futures*, Vol. ahead-of-print No. ahead-of-print, doi: [10.1108/JTF-07-2020-0114](https://doi.org/10.1108/JTF-07-2020-0114).

Coeckelbergh, M. (2020), *AI Ethics*, MIT Press, Cambridge, MA.

Gao, C.A., Howard, F.M., Markov, N.S., Dyer, E.C., Ramesh, S., Luo, Y. and Pearson, A.T. (2022), "Comparing scientific abstracts generated by ChatGPT to original abstracts using an artificial intelligence output detector, plagiarism detector, and blinded human reviewers", *bioRxiv*. doi: [10.1101/2022.12.23.521610](https://doi.org/10.1101/2022.12.23.521610).

Gilson, A., Safranek, C., Huang, T., Socrates, V., Chi, L., Taylor, R.A. and Chartash, D. (2023), "How well does ChatGPT do when taking the medical licensing exams? The implications of large language models for medical education and knowledge assessment", *JMIR Medical Education*, Vol. 9, e45312, doi: [10.2196/45312](https://doi.org/10.2196/45312).

Haque, M.U., Dharmadasa, I., Sworna, Z.T., Rajapakse, R.N. and Ahmad, H. (2022), "I think this is the most disruptive technology: exploring sentiments of ChatGPT early adopters using Twitter data", *arXiv*. doi: [10.48550/arXiv.2212.05856](https://doi.org/10.48550/arXiv.2212.05856).

Iskender, A. (2023), "Holy or unholy? Interview with open AI's ChatGPT", *European Journal of Tourism Research*, Vol. 34, 3414, doi: [10.54055/ejtr.v34i.3169](https://doi.org/10.54055/ejtr.v34i.3169).

Ivanov, S. (2016), "Will robots substitute teachers?", *Yearbook of Varna University of Management*, Vol. 9, pp. 42-47.

Ivanov, S. (2021), "Robonomics: the rise of the automated economy", *ROBONOMICS: The Journal of the Automated Economy*, Vol. 1, 11, available at: <https://journal.robonomics.science/index.php/rj/article/view/11>

Ivanov, S. and Umbrello, S. (2021), "The ethics of artificial intelligence and robotisation in tourism and hospitality – a conceptual framework and research agenda", *Journal of Smart Tourism*, Vol. 1 No. 4, pp. 9-18, doi: [10.52255/smarttourism.2021.1.4.3](https://doi.org/10.52255/smarttourism.2021.1.4.3).

Murphy, J., Hofacker, C. and Gretzel, U. (2017), "Dawning of the age of robots in hospitality and tourism: challenges for teaching and research", *European Journal of Tourism Research*, Vol. 15, pp. 104-111, doi: [10.54055/ejtr.v15i.265](https://doi.org/10.54055/ejtr.v15i.265).

Stokel-Walker, C. (2023), "ChatGPT listed as author on research papers: many scientists disapprove", *Nature*, Vol. 613, pp. 620-621, available at: <https://www.nature.com/articles/d41586-023-00107-z>

Topsakal, O. and Topsakal, E. (2022), "Framework for A Foreign language teaching software for children utilizing AR, voicebots and ChatGPT (large language models)", *The Journal of Cognitive Systems*, Vol. 7 No. 2, pp. 33-38.

Vanian, J. (2022), "Why tech insiders are so excited about ChatGPT, a chatbot that answers questions and writes essays", CNBC, available at: <https://www.cnbc.com/2022/12/13/chatgpt-is-a-new-ai-chatbot-that-can-answer-questions-and-write-essays.html> (accessed 10 February 2023).

Venkatesh, V. and Davis, F.D. (2000), "A theoretical extension of the technology acceptance model: four longitudinal field studies", *Management Science*, Vol. 46 No. 2, pp. 186-204.

Venkatesh, V., Morris, M., Davis, G. and Davis, F. (2003), "User acceptance of information technology: toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-478, doi: [10.2307/30036540](https://doi.org/10.2307/30036540).

Writer, B. (2019), *Lithium-Ion Batteries. A Machine-Generated Summary of Current Research*, Springer, Cham, available at: <https://link.springer.com/content/pdf/10.1007%2F978-3-030-16800-1.pdf>

Corresponding author

Stanislav Ivanov can be contacted at: stanislav.ivanov@vumk.eu

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgroupublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com