

EJEL Editorial 2024: Special Issue on AI in Education: Opportunities and Challenges (Parts 1 & 2)

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The advent of Chat GPT and the other GenAIs that followed provides a very clear impression of the impact that machine learning will have on society. The impact of machine learning had been discussed for more than a decade, but those discussions had a high degree of abstraction and temporal speculation. The irruption of GenAI gives the discussion tangibility and a sense of urgency. It is now essential to define how society is going to govern this technology but before we do that we need to understand the impact that the technology is going to have on the different dimensions of society. In this special issue we attempt to do precisely that in the area of education.

The aim of this Special Issue is to bring together the latest research and developments in AI in education, to better understand how AI can enhance teaching and learning, and to identify the challenges and opportunities in this field. While the first reaction to ChatGPT in academic circles was one of seeing it as CheatGPT, the papers herein demonstrates that we have swiftly moved well beyond that initial state. The papers in this 2-part special issue are depicted in Table 1.

Table 1: Papers in Part 1 and Part 2 of the EJEL Special Issue on AI in Education

Paper id	Citation
PART 1	
#1.1	Cronje, Exploring the Role of ChatGPT as a Peer Coach for Developing Research Proposals: Feedback Quality, Prompts, and Student Reflection
#1.2	Humble et al., Cheaters or AI-Enhanced Learners: Consequences of ChatGPT for Programming Education
#1.3	Klyshbekova, and Abbott, ChatGPT and Assessment in Higher Education: A Magic Wand or a Disruptor?
#1.4	Watanabe, Have Courage to Use your Own Mind, with or without AI: The Relevance of Kant's Enlightenment to Higher Education in the Age of Artificial Intelligence
#1.5	Jose, and Jose, Educators' Academic Insights on Artificial Intelligence: Challenges and Opportunities
#1.6	Tseng, and Lin Enhancing English as a Foreign Language (EFL) Learners' Writing with ChatGPT: A University-Level Course Design
#1.7	Naz, and Robertson, Exploring the Feasibility and Efficacy of ChatGPT3 for Personalized Feedback in Teaching
#1.8	Alrayes, Henari, and Ahmed, ChatGPT in Education – Understanding the Bahraini Academics Perspective
PART 2	
#2.1	Hmoud et al.,

Paper id	Citation
	SI AI Rubric Development and Validation for Assessing Tasks' Solving via AI Cha
#2.2	Pingmuang et al., SI AI Exploring Generative-AI as a Learning Assistant - Understanding Thai Higher Education Students' Adoption: Technology Acceptance Model Research
#2.3	Håkansson Lindqvist et al., SI AI Exploring student and AI generated texts. : Reflections on reflection texts.
#2.4	Castelló-Sirvent et al., SI AI Quo Vadis, University? Discussing a Roadmap on Artificial Intelligence, Ethics
#2.5	Schaeffer et al., SI AI Risks of AI Applications Used in Higher Education
#2.6	Abdulla et al., SI AI Using ChatGPT in Teaching Computer Programming

In Cronjé's paper (#1.1) ChatGPT is used as a coach to help inexperienced researchers overcome the ambiguity that characterises the early stages of defining a research proposal. It is an adaptation to ChatGPT of what is a human-to-human peer coaching method known as GROW (which is an acronym for Goal, Reality, Opportunities, Will.) The paper describes an archival desk-study that analysed a sample of four worksheets out of a population of 93, each one produced by a student that took part of the research methods course. The sample was selected purposely based on that the worksheets "exhibited the clearest characteristics of the phenomenon under study." The students all started with a common prompt to kick off what then became a flow of interactions with ChatGPT. The students were encouraged to reflect on ChatGPT's responses, and at the end of the exercise on their experience with the tool throughout the exercise. Three clear issues emerge from the research: the quality of the feedback given by ChatGPT; the value of the prompts; and the importance of the student's reflection. The author ends with a useful recommendation that novice students given training on how to develop meaningful prompts, react to GenAI feedback, and engage in critical reflection .

Humble et al. (#1.2) set out to enquire on the potential consequences of ChatGPT on programming education in Computer Science. They apply a research method inspired by analytic autoethnography to understand the impact of this technology through the personal experiences of the authors. Their thematic analysis (of six field diaries, 82 interactions with ChatGPT and additional reflection notes) helps them, on the one hand, understand the strengths and weaknesses of ChatGPT that teachers should keep in mind, such as importance of quality of questions (prompts), factual (textbook knowledge) excellence, 'sloppiness'. And, on the other hand, understand the potential consequences that using ChatGPT could have on teaching. ChatGPT can be an obstruction to learning or a great assistant to teachers and students and as a consequence will require re-thinking teaching and learning practices. In short, Computer Science students are going to use GenAI; it is now a question of seeing whether they do it alone with the risks that that entails, or whether teachers take a lead in shaping the future.

Klyshbekova & Abbot (#1.3) set out to do an experiment on the capabilities of ChatGPT-3 to write and assess an essay. They use the Christensen et al (2015) definition of disruptive innovation to assess whether the use of ChatGPT-3 for this purpose is actually disruptive. They commend the GenAI tool for its speed in producing an essay and its human-like interactive style with the user in the process of production. They are not, however, impressed with the quality of the text in the sense that it shows limited creativity and critical thinking. They judge the essay dull as if producing filler-text and highly unreliable in its use of academic references. The experimental part of the work consists in getting ChatGPT-3 to write an essay, define a marking guide, and then mark its own work. The researchers then created their own marking guide following a well-established set of criteria, and used it to assess ChatGPT's essay. They arrive at the human-like condition that ChatGPT rates its own work far higher than do its human appraisers! Is ChatGPT developing consciousness, subjectivity, self-interest? On a more serious note, this paper leaves the reader thinking: Given that ChatGPT consistently gives a different outcome as response to the same prompt, can it ever be trusted to give fair assessments? Furthermore, the authors are calling for revisiting current assessment practices that may be vulnerable to cheating from AI-generated content.

Watanabe (#1.4) does a theoretical study deeply rooted in philosophy (ethics) to assess the effects of AI on education. It relates the use of AI in universities to Kant's reflections on enlightenment. The explicit aim of the article is to theoretically analyse the compatibility of several AI tools with the ideal of maturity on an educational

philosophical level. Maturity has many dimensions to it, but the author opts to look at it from the perspective of critical thinking and independent action. The findings can be categorised into three areas. The first is that Intelligent Tutoring Systems (ITS) deprive the students of independent assessment and reflection on their learning. Moreover, students cannot discuss ITS suggestions or assessments, which discourages critical enquiry. Furthermore, it incentivises students to focus on their own success and thus impairs collaboration and teamwork. The second is that ChatGPT limits students' writing and reading abilities and therefore negatively affect the students' competences for independent interpretation of texts. It leads to passiveness and a lack of independent thinking. Finally, only AI-based research and visualisation tools lead students to conduct independent research without excessive dependence on AI, which promotes development of maturity.

"What are educators' perceptions of the challenges and opportunities of using AI tools in learning and teaching?" is the research question addressed by Jose & Jose (#1.5). They do a qualitative study with a sample of 35 educators in the English language, belonging to two networks at the University of Technology and Applied Science Al Musannah and at the English Language Exchange, Oxford University. They arrive at three main themes: Concerns, Risks/Challenges and Opportunities. If numbers mean anything, it is telling that under Concerns they arrive at eleven sub-themes, ten subthemes for Risks/Challenges and a massive 22 for Opportunities. A basis for optimism? Much of the Concerns arise from AI technology, its rapid rise and possibly hyped popularity. In terms of Risks, the educators worry about job displacements, the stifling of critical thinking, giving feedback on AI-assisted writing and the development of laziness. Finally, the Opportunities: providing templates for writing, learner motivation, AI as an educational aid, its use in teaching potentially dangerous subjects, delivering personal learning experiences, providing interactive tutoring and several others.

Continuing with English as a Foreign Language at University level, only that in this case it is a writing course in Taiwan, Tseng & Lin (#1.6) combine an instructional design model (ADDIE) with a technology-enabled pedagogical model (TPACK) to propose an integrated writing course framework that they test with a sample of 15 students. Primary data collection is done through two stages, the analysis of the students' written work followed by their reflective writings. The authors give a positive outlook stating that the students developed an ethical authorship conscience and a critical stance to combine their ideas with the output of ChatGPT. In their findings the authors reveal that ChatGPT addresses three fundamental challenges often encountered in academic writing courses: (a) it enhances efficiency by providing immediate feedback and generating content ideas; (b) it helps achieve a cohesive organisation within students' writing, guiding them to structure their thoughts more logically; and (c) the students declared in their reflective pieces that ChatGPT helped them eliminate errors by giving them objective feedback that they used to refine their drafts. In conclusion, ChatGPT can effectively be integrated into writing instruction in a form that does not create dependence as long as it is done through a structured and pedagogical framework.

In the final case of language learning, Naz & Robertson (#1.7) explore the efficacy of ChatGPT feedback in written English learning. The authors underpin their work on social cognitive theory (SCT) which supports the use of GenAI in that it gives instant guidance and support that enables personalised, independent learning; and on second language acquisition theory (SLA) that supports that the use of GenAI can enhance student learning by providing meaningful interaction. They use a small sample of four written pieces from four different students, of different lengths and content matter. The authors design a rubric and mark the pieces via ChatGPT and humans using the same rubric, and compare the results. The authors find that ChatGPT can be a great tool through giving students timely feedback and also interaction and motivation. There are problems of errors and hallucinations, but this can be minimised by putting care into the design of the marking guide and complementing it with human oversight. However, the outcome is that ChatGPT can be very helpful but there is some critique on the vagueness of feedback, especially on technical subjects. A key finding is that, the more precise the marking criteria, the more reliable the outcome.

Alrayes (#1.8) take a completely different approach in that they look at the problem of adopting ChatGPT in higher education from the perspective of the educator and in that they do a quantitative study. They address the issues of how socio-demographic factors influence the adoption of ChatGPT by educators; what motivates them and how it impacts their teaching practices; and what social influences affect academics in using ChatGPT. They apply the Unified Theory of Acceptance and Use of Technology (ATAUT) model but reflecting the fact that higher education institutions have not adopted policies on using GenAI tools and therefore it is voluntary for the academics to adopt it, they apply the UTAUT2 version for consumers. Their survey received 141 responses of which the majority are Millennials or Generation X, are highly educated, with a predominance of women, of whom less than half have used ChatGPT or any other GenAI tool. They conclude that education institutions must embark on a strategic roadmap not only for the adoption of GenAI but also adapt to continuous advancements

in the technology. They recommend training both educators and students on their use, and make considerations on ethical aspects. Two of the ethical precautions they make are commendable but unpractical, as they propose transparency in the sense of explicability of how ChatGPT arrives at its responses, and concerns around student data collection, both of which are intrinsic to how current large learning models work.

In their study, Hmoud et al. (#2.1) aimed to systematically evaluate the educational impact of AI by creating and testing a rubric designed to assess student work when supported by AI chatbots. The process began with a review of the literature, from which the authors identified 37 key assessment criteria. These were evaluated by a panel of 12 ICT professionals and applied to the final assignments of 144 education students. After applying various statistical methods for content validation, the list was refined to 9 essential items, which were grouped into two categories based on factor analysis. The first, "Quality of Content," encompassed criteria like accuracy, relevance, coherence, comprehensiveness, grammar and spelling, argumentation and evidence. The second, "Quality of Expression," included efficiency, language and tone, creativity and originality. While this research contributes to the fast-developing area of AI chatbot assessment, the authors acknowledge that further validation is needed—particularly with larger sample sizes and in more varied educational contexts.

Kanont et al. (#2.2) used the Technology Acceptance Model (TAM) to explore factors influencing the adoption of GenAI tools among Thai university students. Surveying 911 students across various subjects, they found that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) significantly impacted adoption. Interestingly, PU and PEOU were negatively correlated, suggesting that as GenAI becomes more intuitive, students may see it as less valuable for learning. This highlights a paradox where students, while open to GenAI, recognise potential downsides to its educational impact. The authors also discuss the importance of universities promoting ethical AI integration, and address challenges like language barriers for non-native English speakers. They also suggest future research should focus on qualitative data and longitudinal studies to gain deeper understanding of the factors influencing adoption and how they evolve over time.

Castelló-Sirvent et al.'s bibliometric study (#2.3) examines AI and academic integrity in higher education (HE), analyzing 254 studies from high-impact journals. The research identifies four key themes: i) technological and design factors influencing AI adoption in HE, ii) machine learning-based prediction of student performance, iii) AI's role in interventions affecting academic integrity and student attitudes, and iv) constraints in the learning environment that AI can help address. The study offers practical insights for educators, academic authorities, and policymakers, highlighting issues such as ethical AI use, faculty commitment to academic integrity, AI's financial and organisational impact, and its influence on social mobility.

Håkansson Lindqvist and Arvidsson's study (#2.4) compares students' reflections (N=20) with ChatGPT-generated texts, revealing notable content differences. While students provided reflective texts with in-depth, personal insights into their learning, ChatGPT offered only questions to guide and support reflection. Thus, the AI did not produce texts that students could submit (i.e., plagiarise); instead, it helped guide students toward deeper reflections. These findings may assist teachers in designing assessments, and the study could be expanded to a larger sample and exploring different types of reflection.

A study by Abdulla et al. (#2.5) seeks to integrate ChatGPT into computer programming curricula to enhance students' learning. The research employs a quasi-experimental design, comparing an experimental group that used ChatGPT with a control group that did not. A total of 26 undergraduate students from a university in Oman participated. Evaluation methods included two in-class exams and two in-lab tasks. Quantitative analysis showed that while ChatGPT can be a valuable tool for general programming queries, its effectiveness may vary with highly specific questions. The experiment was further supported by qualitative data from semi-structured interviews with 16 participants from the same group, revealing that students found ChatGPT to be a valuable learning aid and that combining ChatGPT with traditional teaching methods could further optimise learning outcomes. The authors recommend further research to explore the long-term effects of AI integration in educational settings.

Schaeffer et al.'s viewpoint article (#2.6) examines the risks of AI applications in higher education and aims to initiate discussion among developers, decision-makers, and users about mitigating these risks. The main concerns include transparency of AI models, user privacy, data confidentiality, integrity, system availability, and bias, all stemming from data-related issues such as data being used beyond its intended purpose or collected from unintended sources. The authors recommend adopting a recognised risk management framework to address these challenges and conclude that the benefits of AI in higher education can only be realised if institutions enforce strict governance and compliance measures.

Reflecting on the content of the papers included in this special issue we extract and synthesises the key concepts from these papers, which we show in Table 2.

Table 2: Key concepts that arise from the papers in the Special Issue, Parts 1 & 2 (the numerals in the reference columns correspond to the numerals in Table 1)

Used correctly GenAI has strengths:	References	Used incorrectly GenAI has weaknesses:	References
<p>EFFICIENCY</p> <p>1.Speed to produce essays</p> <p>2.Generates content ideas</p>	<p>#1.3</p> <p>#1.5, #1.6</p>		
<p>INTERACTIVE FLOW</p> <p>3.Provides immediate feedback</p> <p>4.Performs human-friendly interaction</p> <p>5.Provides interactive tutoring</p> <p>6.Provides Peer-to-Peer like coaching to inexperienced researchers</p> <p>7.Assisting students in task-solving e.g. drafting outlines, revising content, proofreading, and post-writing reflection</p>	<p>#1.6</p> <p>#1.3</p> <p>#1.5, #1.7</p> <p>#1.1</p> <p>#2.1, 2.4</p>		
<p>RELIABILITY</p> <p>8.Weakness 3. Can be minimised with good design of rubric and complemented with human oversight</p>	<p>#1.7, #2.1</p>	<p>1.Unreliable use of academic references</p> <p>2.Hallucinations</p> <p>3.Given that the same prompt can different outcomes: Can it be trusted for student assessment?</p> <p>4.Inaccuracy & incompleteness</p>	<p>#1.3</p> <p>#1.1, #1.7</p> <p>Reflection on #1.3</p> <p>#2.6</p>
<p>EDUCATIONAL AID</p> <p>9.Leads to motivation</p> <p>10.Useful for teaching potentially dangerous subjects</p> <p>11.Enables personalised learning</p> <p>12.Can support task-solving assessments when evaluated against the identified criteria.</p> <p>13.Can support reflection</p>	<p>#1.5, #1.7</p> <p>#1.5</p> <p>#1.5</p> <p>#2.1</p> <p>#2.4</p>	<p>5. Educators worry about job displacements</p> <p>6.Vagueness of feedback</p>	<p>#1.5</p> <p>#1.7</p>
<p>QUALITY OF WRITING</p> <p>14.Cohesive structure of written reports</p>	<p>#1.6</p>	<p>7.Poor quality of text</p> <p>- No creativity</p> <p>- Dull, filler text</p>	<p>#1.3</p>
<p>STUDENT DEVELOPMENT & MATURITY</p> <p>15.AI-based research assistance and data visualisation lead to independent thinking</p> <p>16.Develops increased authorship conscience</p> <p>17.Increases critical stance from combining own ideas with GenAI output</p> <p>18.Done within pedagogical framework does not create dependency</p>	<p>#1.1, #1.4</p> <p>#1.6</p>	<p>8.Use leads to poor critical thinking</p> <p>9.Inhibits independent action</p> <p>10.Incentivises students to focus on their own success and not teamwork</p> <p>11.Limits development of reading and writing skills</p>	<p>#1.3, #1.5</p> <p>#1.4</p> <p>#1.4</p>

Used correctly GenAI has strengths:	References	Used incorrectly GenAI has weaknesses:	References
	#1.6 #1.6	12. Creates excessive dependency 13. Development of laziness 14. Students' privacy & ethical concerns	#1.4 #1.4 #1.5 #1.8, #2.2
STUDENT PERFORMANCE 19. Increased student performance in general (subject) knowledge and less so in more specific questions	#2.5	15. Negative impact on learning	#2.2

In summary, the findings from these papers suggest that the higher education community is cautiously optimistic about the potential of AI tools, while also being aware of the associated risks and pitfalls (Pelletier et al., 2024). From our analysis, we derive the following insights:

- It is clear that students are already using GenAI and will continue doing so. So, are we going to leave them to use it on their own, without guidance, with all the risks that that entails? Or will educators take leadership and guide them? (#1.2)
- The advent of machine learning and their adoption by higher education institutions will require a re-think of teaching, learning and assessment practices. (#1.3)
- Higher education institutions need to embark in incorporating GenAI and its future development in their strategic roadmap. (#2.2, #2.3)
- Higher education institutions need to define ethical guidelines for the use of GenAI, and train educators and students on their use and on understanding of the ethical implications of their use. (#1.8, #2.1, #2.2, #2.3)
- When properly assessed and integrated AI chatbots could be valuable in higher education (#2.1, #2.4, #2.6).

We are convinced that this special issue meets its objective of giving students and educators a better understanding of how GenAI can enhance teaching and learning, as well as help lay down some foundations for the governance of GenAI and its successor machine-learning solutions in the educational domain.

References

Pelletier, K., McCormack, Muscanell, N, Reeves, J., Robert, J., Arbino, N., (2024). *2024 EDUCAUSE Horizon Report: teaching and learning edition* (pp. 1-46). EDUC24.