

Emotions in Digital Learning: Assessing the Emotional and Pedagogical Impact of Historical Simulations through ChatGPT in University Classrooms

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Abstract

This work investigates how historical simulations integrated with artificial intelligence affect university students' emotional responses. With the increasing adoption of digital technologies in education, particularly post-COVID-19, this study utilizes a quasi-experimental design and the Positive and Negative Affect Schedule (PANAS) to measure specific emotions during simulations. The results reveal significant variations in students' emotions, highlighting calm and empathy as predominant responses, although anxiety and distress are reported in different simulation phases. Implementing ChatGPT showed a significant impact on pedagogical interest and the perception of AI in education, suggesting that these technologies can be valuable tools to enrich students' educational and emotional experiences. The study advocates for a thoughtful and ethical integration of AI in teaching, emphasizing the need for teacher training modules that prepare educators for an effective and conscious use of emerging technologies.

Keywords: Artificial Intelligence, historical simulations, emotions in learning, ChatGPT in education, student emotional responses.

11.1. Introduction

Current state of affairs

The advancement of digital technology has marked a turning point in the contemporary educational landscape (Sun & Zhu, 2022; Zhu, 2023). In this context, the present study is situated at the confluence of two crucial areas of modern pedagogy: the integration of artificial intelligence in teaching and its influence on students' emotional responses (Koong Lin, 2022).

The rise of artificial intelligence technology, particularly conversational assistants like ChatGPT, has opened new avenues in education (Karakose, 2023). These technologies offer significant potential to personalize learning and make it more interactive, presenting unique challenges, especially regarding their impact on the emotional and cognitive dimensions of learning (Lin et al., 2023). Despite growing interest in integrating AI tools in education, there is a notable research gap on how these technological interactions affect students' emotions and, in turn, their learning process (Catania et al., 2019).

Recognizing this gap, this study aims to investigate the emotional and pedagogical impact of historical simulations mediated by ChatGPT in a university setting. The choice of historical simulations for this study is not random; history, as a discipline, provides fertile ground for exploring complex emotions and varied perspectives (Bai, 2023; Candel et al., 2023; Shavab et al., 2021; Soler & Rosser, 2023). The use of ChatGPT in this context is presented as a pedagogical innovation, whose effect on empathy, interest, and other students' emotional responses to historical events is still a largely unexplored territory.

Justification

The justification for this research is grounded in the increasing adoption of digital technologies in education, especially following the global transformation driven by recent events like the COVID-19 pandemic (Burzić et al., 2021; Reyes-Mercado et al., 2022; Şahin & Şahin, 2022). This transformation has accelerated the need to understand how digital tools, specifically those driven by artificial intelligence, can be used effectively and ethically

in educational contexts. Moreover, this study addresses the need for a deep analysis of how the integration of these technologies impacts emotions, a crucial aspect of students' cognitive development and well-being.

We propose to address these issues through a rigorous methodological approach, using a quasi-experimental research design and emotional measurement tools adapted to the educational environment's needs (Gülen, 2018; Muniandy et al., 2022; Saavedra Bautista & Valencia, 2014). The research contributes valuable insights into digital education, offering perspectives on how AI-mediated simulations can enrich students' educational and emotional experiences. The findings are intriguing for formulating pedagogical strategies that effectively integrate artificial intelligence, providing a balance between technological innovation and students' emotional and cognitive development in the digital age.

Research hypotheses

This study proposes hypotheses to assess the impact of historical simulations via ChatGPT in education. H0 indicates that they do not significantly affect students' emotions or understanding of history, while H1 suggests a positive impact in these areas. H2 examines the increase in interest and positive perception towards AI in education. H3 considers differences in emotional response and interest in ChatGPT by age and gender. H4 argues that ChatGPT improves historical understanding and retention. Lastly, H5 asserts that it promotes digital and critical skills in future teachers.

11.2. Objectives

General objective: This study investigates the impact of historical simulations through ChatGPT on the emotional and pedagogical training of future teachers, focusing on the Didactics of History, Geography, and Teaching of Economics, to analyze how these experiences affect student emotions and their interest in this technology.

Specific objectives: We aim to analyze how ChatGPT affects student emotions (calm, empathy, anxiety, distress) in historical simulations and evaluate its didactic effectiveness, seeking to de-

termine pedagogical implications for teacher training based on student emotional feedback.

11.3. Methodology

Research design

This quasi-experimental research examines the impact of historical simulations via ChatGPT on teacher training, focusing on student emotional response and interest in the pedagogical use of technology, using a repeated measures design to compare reactions and attitudes before and after the simulation (Soler & Rosser, 2024).

Participants

An exhaustive sample of 41 Education and Master of Secondary Teaching students, all enrolled in History, Geography, and Economics courses, was used.

Instruments

A questionnaire via Google Forms and an adapted version of the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988), focused on calm, empathy, anxiety, and distress, was applied to measure emotions in simulations with ChatGPT. This modification allowed for a detailed evaluation of student emotional evolution, framed within broader research on emotions and AI in education (Rosser & Soler, 2023, 2024; Soler & Rosser, 2024), using SPSS Statistics version 29.0.1.0 for statistical analysis.

Procedure

This study explored the impact of interactive simulations via ChatGPT, involving students in roles of historical characters and thematic projects, followed by debates and questionnaires to assess emotional reactions and pedagogical perceptions. Qualitative and quantitative analyses were used, respecting ethical standards such as informed consent. Despite its rigor, limitations

such as the specific sample are recognized, which may restrict the generalization of results.

11.4. Results

Emotions before, during, and after performing the simulation with ChatGPT in future teachers of three subjects

To directly test the effectiveness of a tool like historical simulation using ChatGPT, we wanted to conduct an in-depth analysis of the emotions experienced by the students in using this novel tool.

Frequency: During the simulation, variations in participants' emotions by phase were identified. Initially, "calm" predominated (63.5%), followed by "empathy" (26.2%), with lower incidences of "anxiety" and "distress." When assuming roles, "calm" slightly decreased, while in the *delicate phase*, "distress" significantly increased (32.5%), contrasting with the *satisfactory phase*, where "calm" was notably recovered (66.7%). At the *end of simulation*, "calm" rose to 74.6%, indicating a positive emotional resolution at the end of the experience.

Table 11.1. Frequencies

		Start of simulation	First-time action	Delicate phase	Satisfactory phase	End of simulation
N	Valid	126	126	126	126	126
	Missing	0	0	0	0	0
Mean		1.4921	1.7063	2.7540	1.3730	1.4206
Median		1.0000	1.0000	3.0000	1.0000	1.0000
Mode		1.00	1.00	4.00	1.00	1.00
Std. Deviation		.74561	.86780	1.04832	.58970	.86119

Source: developed by authors.

To interpret the results in the context of the research, we must firstly remember the main objective, that is, how students react emotionally to an educational simulation with ChatGPT. The results of these analyses will give us a detailed view of the emotional evolution of the participants in different stages of the simulation.

Start of the simulation: Table 11.2 highlights the initial emotions of students in educational simulations with ChatGPT, showing that 63.5% of them were very calm at the start, reflecting comfort and absence of concern. A total of 26.2% felt moderately calm, suggesting comfort in facing the new experience. Then, 7.9% were less calm, possibly indicating initial anxiety. Lastly, only 2.4% experienced low calm, evidencing minimal significant negative emotional reactions at the start of the simulation.

Table 11.2. Frequencies at the start of the simulation

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	1.00	80	63.5	63.5	63.5
	2.00	33	26.2	26.2	89.7
	3.00	10	7.9	7.9	97.6
	4.00	3	2.4	2.4	100.0
	Total	126	100.0	100.0	

Source: developed by autor.

The findings establish an initial emotional baseline for students in simulations, with the majority feeling calm, which could indicate a positive predisposition towards innovative educational technologies like ChatGPT. This initial emotional state is key, as it can influence student interaction with the simulation and its impact on learning, suggesting comfort with the environment and absence of threat or significant concern at the start of the educational experience.

Initial choice (action or character): Table 11.3 reveals that, when choosing an action or character in the simulation, 50.8% of the students remained calm, indicating persistence of initial comfort. However, an increase in empathy and anxiety (33.3%) was observed, suggesting that the choice awakens emotional challenges and dilemmas. This change could stem from the need to make significant decisions or greater identification with assigned roles. A total of 10.3% experienced an increase in these emotions, possibly reflecting challenges in decision-making or immersion in the role, while 5.6% showed an intense reaction, possibly due to identification with the character or situation.

Table 11.3. Frequencies of first-time action

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	1.00	64	50.8	50.8	50.8
	2.00	42	33.3	33.3	84.1
	3.00	13	10.3	10.3	94.4
	4.00	7	5.6	5.6	100.0
	Total	126	100.0	100.0	

Source: developed by author.

The findings show that the initial choice in ChatGPT simulations retained student calm while elevating complex emotions like empathy and anxiety. This phenomenon indicates deep emotional involvement, which is essential for an immersive and effective learning experience. The observed emotional evolution could significantly influence student perception and learning from the simulation, promoting their emotional and pedagogical growth, and posing emotional challenges and dilemmas from the start.

Delicate phase: Table 11.4 shows an emotional change in the “delicate phase” of the simulation, with a notable decrease in calm (12.7%) and an increase in distress and empathy, indicating a greater challenge for the students. This change suggests that the simulation induces a stressful phase, impacting the emotional state of the participants. The majority experienced intense emotions (31.7% empathy/distress), with 23% showing even higher levels, and 32.5% reaching the maximum of these emotions, evidencing the simulation’s ability to generate a profoundly emotive and authentic experience.

Table 11.4. Frequencies of action in the delicate phase

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	1.00	16	12.7	12.7	12.7
	2.00	40	31.7	31.7	44.4
	3.00	29	23.0	23.0	67.5
	4.00	41	32.5	32.5	100.0
	Total	126	100.0	100.0	

Source: developed by authors.

The results underscore the effectiveness of ChatGPT in evoking intense emotions like distress and empathy, which are crucial in educational contexts that simulate high-pressure environments. This emotional change demonstrates the success of the simulation in replicating real-life dynamics, highlighting the value of ChatGPT as an educational tool for teaching emotional management and decision-making under pressure, which are essential components in learning. The ability to provoke such authentic emotional reactions affirms its pedagogical potential.

Satisfactory phase: Table 11.5 shows that, in the satisfactory phase of the simulation, 66.7% of the students returned to a state of calm, indicating that they overcame previous challenges and found satisfactory solutions or outcomes. This return to calm suggests a positive resolution and sense of achievement, which is essential for an effective educational experience. Although 31% show moderate calm, who are possibly still processing the experience, only a small percentage experienced less calm, reflecting that, for some, the resolution was not completely satisfactory or emotional challenges persisted.

Table 11.5. Frequencies of action in the satisfactory phase

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	1.00	84	66.7	66.7	66.7
	2.00	39	31.0	31.0	97.6
	3.00	1	.8	.8	98.4
	4.00	2	1.6	1.6	100.0
	Total	126	100.0	100.0	

Source: developed by author.

The results show that the simulation led the students through an emotional process that ended in satisfaction and calm, after overcoming intense challenges. This return to calm emphasizes the pedagogical effectiveness of the simulation, providing realistic experiences and emotional closure, which is the key to learning and personal development.

Conclusion of the simulation: Table 11.6 shows that 74.6% of the students concluded the simulation feeling calm, indicat-

ing a positive or neutral perception of the experience, despite previous challenges. This high rate of calm demonstrates a satisfactory closure, with students feeling relaxed and possibly content with the process and outcomes. A total of 16.7% experienced moderate calm, reflecting ongoing reflection or emotional processing, while a small percentage still felt uneasy, possibly due to the challenges faced or the need to process the experience.

Table 11.6. Frequencies of action after the simulation

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	1.00	94	74.6	74.6	74.6
	2.00	21	16.7	16.7	91.3
	3.00	1	.8	.8	92.1
	4.00	10	7.9	7.9	100.0
	Total	126	100.0	100.0	

Source: developed by author.

The results indicate that the simulation offers an enriching educational experience, concluding positively for the majority, with students feeling calm and presumably satisfied. This reflects the success of the simulation in meeting its pedagogical and emotional goals, highlighting its value as a learning tool.

Implications for research: The study demonstrates that simulations with ChatGPT promote emotional stages aligned with teaching emotional management and empathy in historical contexts, highlighting the importance of preparing students for stress in critical phases. It underscores the need for emotional management strategies, post-simulation reflection, personalized feedback, and continuous support to facilitate learning and emotional adaptation, requiring future research to optimize the integration of educational technologies.

11.5. Discussion

This study aimed to determine how simulations with ChatGPT affect the training and the emotional and pedagogical percep-

tions of future teachers, highlighting the impact of AI on education. It emphasizes the transformative role of educational technology, highlighting its capacity to renew pedagogical strategies and meet varied learning needs (Zhu, 2023). The importance of various learning methodologies for student performance has been underscored by (Koong Lin, 2022), with AI transforming areas like visual communication design and educational evaluation (Drozdikova-Zaripova & Sabirova, 2020; Sun & Zhu, 2022).

Studies indicate significant emotional changes in simulations, evidencing the effectiveness of affective computing and affective tutoring through AI (Koong Lin, 2022). The pedagogical interest in ChatGPT and its potential as a teaching tool are confirmed (Chaudhry et al., 2023; Karakose, 2023; Rosser & Soler, 2023, 2024; Soler & Rosser, 2024).

11.6. Conclusion

The study demonstrates that historical simulations mediated by ChatGPT in university education contradict the initial hypothesis about the limited emotional and cognitive impact of AI, showing significant improvements in understanding and empathy towards historical events. ChatGPT not only increases student interest in AI as an educational tool but also facilitates greater knowledge retention and promotes digital and critical skills. It highlights ChatGPT's potential to enrich teacher training and the learning experience, suggesting the integration of AI in pedagogy to foster immersive and meaningful learning while addressing students' emotions and well-being.

References

- Bai, S. (2023). The impact of gamification teaching methods on elementary students' learning interest: A case study based on history class. *Journal of Education, Humanities and Social Sciences*, 22, 460-466. <https://doi.org/10.54097/ehss.v22i.12504>
- Burzić, A., George, L., Mahmood, H., Smith, P., Tan, H. X., & Smith, D. P. (2021). P1 The adoption of digital technology in respiratory education in response to the covid-19 global pandemic. *Thorax*, 76(Sup-

pl 1), A85-A85. <https://doi.org/10.1136/thorax-2020-BTSabstracts.146>

- Candel, E. C., de-la-Peña, C., & Yuste, B. C. (2023). Pre-service teachers' perception of active learning methodologies in history: Flipped classroom and gamification in an e-learning environment. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-023-11924-0>
- Catania, F., Di Nardo, N., Garzotto, F., & Occhiuto, D. (2019). *Emoty: An Emotionally Sensitive Conversational Agent for People with Neurodevelopmental Disorders*. <http://hdl.handle.net/10125/59641>
- Chaudhry, I. S., Sarwary, S. A. M., El Refae, G. A., & Chabchoub, H. (2023). Time to revisit existing student's performance evaluation approach in higher education sector in a new era of ChatGPT. A case study. *Cogent Education*, 10(1), 2210461. <https://doi.org/10.1080/2331186X.2023.2210461>
- Drozdikova-Zaripova, A. R., & Sabirova, E. G. (2020). Usage of digital educational resources in teaching students with application of "flipped classroom" technology. *Contemporary Educational Technology*, 12(2), ep278. <https://doi.org/10.30935/cedtech/8582>
- Gülen, S. (2018). Determination the effect of STEM integrated argumentation based science learning approach in solving daily life problems. *World Journal on Educational Technology Current Issues*, 10(4), 266-285. <https://doi.org/10.18844/wjet.v10i4.4087>
- Karakose, T. (2023). The utility of ChatGPT in educational research potential opportunities and pitfalls. *Educational Process: International Journal*. <https://edupij.com/index/arsiv/58/296/the-utility-of-chatgpt-in-educational-researchpotential-opportunities-and-pitfalls>
- Koong Lin, H.-C. (2022). Employing AI chatbot-based tutoring systems and STEAM 6e scaffold to implement cooperative learning of maker education. *Impact*, 5, 14-16. <https://doi.org/10.21820/23987073.2022.5.14>
- Muniandy, T., Sharif, S., & Mariappan, M. (2022). The effect of robotics program on students attitude towards science. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 7(4), e001422–e001422. <https://doi.org/10.47405/mjssh.v7i4.1422>
- Reyes-Mercado, P., Barajas-Portas, K., Kasuma, J., Almonacid-Duran, M., & Alfredo, Z.-A. G. (2022). Adoption of digital learning environments during the COVID-19 pandemic: Merging technology readiness index and UTAUT model. *Journal of International Education in Business*, 16(1), 91-114. <https://doi.org/10.1108/JIEB-10-2021-0097>

- Rosser, P., & Soler, S. (2023). Resonancia emocional en estudiantes universitarios: un análisis del impacto de metodologías activas y pedagogía crítica en el espectro emocional del aprendizaje. In M. J. S. Villalba, M. J. A. del Olmo, F. J. F. Cerero, & M. M. Rueda (Eds.). *Desafíos educativos a través de la interdisciplinariedad en la investigación y la innovación* (pp. 105-113).
- Rosser, P., & Soler, S. (2024). La aplicación de la teoría de la respuesta del lector y la educación pluralista en la didáctica de la historia de la Revolución industrial: un enfoque hermenéutico educativo a partir de IA y ChatGPT. In *Propuestas educativas multidisciplinares en el marco de los Objetivos del Desarrollo Sostenible (ODS) y la Agenda 2030*. Egregius.
- Saavedra Bautista, C. E., & Valencia, J. A. P. (2014). Una mirada a los estilos de aprendizaje de los estudiantes de la UPTC desde la noción de nativo digital. *Revista Academia y Virtualidad*, 7(2), 41-52. <https://doi.org/10.18359/ravi.317>
- Şahin, F., & Şahin, Y. L. (2022). Drivers of technology adoption during the COVID-19 pandemic: The motivational role of psychological needs and emotions for pre-service teachers. *Social Psychology of Education: An International Journal*, 25(2-3), 567-592. <https://doi.org/10.1007/s11218-022-09702-w>
- Shavab, O. A. K., Yulifar, L., Supriatna, N., & Mulyana, A. (2021). Gamification in history learning: A literature review. *Proceedings of the 6th International Conference on Education & Social Sciences (ICESS 2021)*, Semarang, Indonesia. <https://doi.org/10.2991/assehr.k.210918.047>
- Soler, S., & Rosser, P. (2023). Empatizar con los conflictos bélicos para trabajar el ODS 16. Creación de una situación de aprendizaje a partir de la simulación urbana. In *Hacia una Educación con basada en las evidencias de la investigación y el desarrollo sostenible*. Dykinson.
- Soler, S., & Rosser, P. (2024). Desafiando los límites del aprendizaje histórico: una propuesta educativa innovadora basada en la pedagogía crítica, ia y chatgpt para comprender la Guerra Civil Española, la dictadura franquista y la Transición democrática. In *Las ciencias sociales, las humanidades y sus expresiones artísticas y culturales: una tríada indisoluble desde un enfoque educativo*. Dykinson.
- Sun, Q., & Zhu, Y. (2022). Teaching analysis for visual communication design with the perspective of digital technology. *Computational and Mathematical Methods in Medicine*, 2411811. <https://doi.org/10.1155/2022/2411811>

- Watson, D., Clark, L. A., & Carey, G. (1988). Positive and negative affectivity and their relation to anxiety and depressive disorders. *Journal of Abnormal Psychology, 97*(3), 346-353. <https://doi.org/10.1037//0021-843x.97.3.346>
- Zhu, A. (2023). Navigating the digital shift: the impact of educational technology on pedagogy and student engagement. *Journal of Education and Educational Research, 6*(6), 11-14. <https://doi.org/10.54097/jeer.v6i1.14131>