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The role of ChatGPT in the development of academic skills according to study areas

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This study examines the perceived usefulness of ChatGPT in developing specific academic skills among students from various fields of study. Using a quantitative and comparative approach, responses from students in Social Sciences and Humanities, Natural Sciences, Technical Areas, and Exact Sciences were analysed regarding ChatGPT's utility in three key skills: communication, idea generation, and information synthesis. Results show significant variations in the perceived usefulness of ChatGPT across disciplines. Students in Social Sciences and Humanities highly value ChatGPT for organising and expressing ideas, while Natural Sciences students find it more useful for synthesising complex information. Conversely, students in technical and exact areas perceive lower utility, likely due to the specific precision and technical demands of their fields. This study contributes to the literature on artificial intelligence (AI) in education by emphasising the need for an adaptive approach to AI implementation to maximise its effectiveness. Implications for higher education and recommendations for responsible, tailored integration of AI to enhance academic skills are discussed.

Keywords: ChatGPT; artificial intelligence; higher education; academic skills; perceived usefulness; study areas

Introduction

In various areas of life, artificial intelligence (AI) has driven significant transformations, affecting sectors such as work and education (Hassani et al., 2020; Marimon et al., 2025). In the educational field, AI has introduced advanced tools that facilitate learning, teaching, and research, offering students and educators unprecedented access to personalised resources and optimising educational processes (Aler Tubella et al., 2023; Leong et al., 2023). One such tool is ChatGPT, a generative language model developed by OpenAI, which has gained popularity in education due to its ability to assist students with tasks such as generating ideas, writing, and organising complex concepts (Chiarello et al., 2024; Khan et al., 2023). This technology represents

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a significant innovation in education, as it enables students to access rapid, tailored responses that meet their specific needs (Adeshola & Adepoju, 2024; Cao et al., 2023). However, despite its widely recognised value, few studies explore how ChatGPT contributes to the development of specific academic skills, particularly in relation to various fields of study.

Research in educational technology suggests that digital tools can enhance motivation and academic satisfaction when students perceive that these tools align with their learning goals (Cao et al., 2023; Haleem et al., 2022). ChatGPT, with its ability to support communication, idea generation, and information synthesis, offers a significant opportunity to explore its impact on key academic skills (Mohamadi et al., 2023). However, the perceived value of these skills likely varies depending on the demands and expectations of each academic discipline (Aydın & Karaarslan, 2023). For instance, in social sciences and humanities, where critical thinking and idea structuring are central, ChatGPT could be especially useful for writing and analytical tasks (Lozić & Štular, 2023). Conversely, in technical and scientific areas, where methodological rigour and precision are prioritised, its value might be perceived differently, as these disciplines require a specific focus on problem-solving and data analysis (Ryan & Deci, 2000).

A growing body of research has explored the role of AI in education, particularly regarding its potential to enhance student engagement, academic performance, and skill development. However, much of the existing literature focuses on the general impact of AI tools such as ChatGPT without fully addressing how students from different academic disciplines perceive and utilise them. While studies such as those by Amarathunga (2024) and Chiarello et al. (2024) have examined AI applications in education, few have systematically compared its perceived usefulness across distinct fields of study. This gap highlights the need for a more nuanced understanding of how AI tools support or fail to meet the unique demands of various academic domains. By analysing differences in students' experiences with ChatGPT, this study aims to provide insights that inform the discipline-specific adaptation of AI in higher education.

Furthermore, the context in which students engage with AI is influenced by institutional policies, digital literacy levels, and prior exposure to technology-enhanced learning environments. Universities worldwide are adopting diverse approaches to AI integration, yet little is known about how these institutional factors shape students' perceptions of AI utility. This study seeks to bridge this knowledge gap by considering not only disciplinary differences but also the broader educational policies and technological infrastructures that influence AI adoption. Understanding these contextual factors will allow for more effective AI implementation strategies that align with institutional priorities while fostering responsible and critical engagement with AI tools in higher education.

This study addresses the following research question: How does ChatGPT contribute to the development of specific academic skills across different fields of study? This question is crucial to understanding how to tailor the use of AI tools to the needs and characteristics of each discipline, optimising their effectiveness.

The objective of this study is, therefore, to explore variations in students' perceptions of ChatGPT's usefulness across different fields of study, particularly regarding its support for academic skills such as communication, idea generation, and information synthesis. Through this analysis, we aim to gain a clear understanding of how AI can be implemented in a personalised manner in higher education, maximising its potential for diverse academic profiles.

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This study is relevant because it responds to the growing demand for AI tools in education and their impact on academic development. With the increasing use of technological platforms in education, it is essential to identify the most effective applications for each academic discipline (Montenegro-Rueda et al., 2023). Previous research has highlighted the need for a contextualised implementation of AI that considers the characteristics and competencies specific to each discipline to maximise effectiveness while avoiding dependency that might hinder the development of critical and autonomous skills (Amarathunga, 2024).

This analysis seeks to fill a gap in the current literature by addressing how students perceive the impact of ChatGPT on their learning based on their field of study. By better understanding differences in the perceived utility of ChatGPT for key academic skills, practical recommendations can be offered to optimise its use across disciplines, tailoring AI implementation in higher education institutions and promoting more meaningful and effective learning.

This work provides a detailed understanding of how ChatGPT can support the development of academic skills across various disciplines, offering a foundation to guide educators and administrators in integrating this tool (ElSayary, 2024). Furthermore, the findings will help identify areas where ChatGPT is particularly useful and areas where adaptations or more specific AI tools may be required. This information is key for designing educational policies that integrate AI in an ethical, effective manner, aligned with the needs of each academic field (Spivakovsky et al., 2023).

The article is organised as follows: firstly, the study's methodology is described, outlining the design, data collection, and analysis methods used to evaluate perceptions of ChatGPT's usefulness across different fields of study. Next, the results are presented, followed by a discussion interpreting these findings in the context of current literature on AI in education. Finally, the conclusions and recommendations for future research are provided.

In summary, this study seeks to understand how ChatGPT usage contributes to the development of specific academic skills across various fields of study, offering an evidence-based and adaptive perspective on the use of AI in higher education. This analysis aims to inform educational practices that maximise the potential of AI, enabling more personalised learning aligned with the contemporary demands of each discipline.

Methodology

Study design

This study employed a quantitative, descriptive, and comparative approach to analyse how ChatGPT contributed to the development of academic skills in different fields of study. The research focused on three key skills: communication, idea generation, and information synthesis.

Participants

The sample consisted of undergraduate, graduate, and doctoral students from three universities in the province of San Juan. Participants were segmented by their field of study into four main groups:

- Social Sciences and Humanities: Included students from disciplines such as sociology, psychology, philosophy, history, literature, and education.
- Natural Sciences: Included students from biology, chemistry, physics, and other experimental sciences.
- Technical Areas: Included students from engineering, computer science, and technology-related fields.
- Exact Sciences: Included students from mathematics and related disciplines.

Measurement instrument

A structured questionnaire using Likert scales was employed to gather data on the perceived usefulness of ChatGPT in developing academic skills. The questionnaire was developed by the authors to specifically assess the perceived usefulness of ChatGPT in academic skills development. While some questions were inspired by prior research on AI in education, no existing validated scale was used in its entirety. Instead, the instrument was tailored to this study's objectives and pilot-tested to ensure clarity and relevance.

The questionnaire used a 5-point Likert scale ranging from 1 ('Not useful at all') to 5 ('Extremely useful'). A distribution analysis of responses showed that most participants selected values between X and Y, indicating (describe trend: normal distribution, skewed towards high scores, etc.).

The questionnaire consisted of sections measuring the perceived utility of ChatGPT in three specific skills:

- Communication: Questions focused on how ChatGPT facilitated clarity and effectiveness in expressing ideas.
- Idea Generation: Questions addressed how ChatGPT assisted in creating and organising initial concepts.
- Information Synthesis: Questions measured ChatGPT's utility in condensing and summarising relevant information.

Each section used a 5-point Likert scale, where one indicated 'Not useful at all' and five indicated 'Extremely useful'. Demographic questions were also included to identify each participant's field of study and frequency of ChatGPT usage.

Procedure

The questionnaire was distributed virtually among students from the three participating universities.

The invitation included a link to the survey and explained the study's objectives, along with the estimated response time (10–15 min).

Students responded anonymously and voluntarily, ensuring data confidentiality.

Data segmentation by field of study

Data were organised according to the field of study declared by participants, creating subsets for Social Sciences and Humanities, Natural Sciences, Technical Areas, and Exact Sciences.

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Each subset was analysed independently to observe differences in the perceived usefulness of ChatGPT.

Data analysis

To assess the perceived usefulness of ChatGPT across different academic disciplines, descriptive statistics were calculated, including mean values and standard deviations. Chi-square tests were performed to evaluate the association between academic field and perceived usefulness, while analysis of variance (ANOVA) tests were conducted to compare mean differences across disciplines.

ANOVA tests were used to compare mean differences in the perceived usefulness of ChatGPT across academic disciplines. Given the independent nature of the three assessed skills (communication, idea generation, and information synthesis), a MANOVA was not deemed necessary. No weighting adjustments were applied to the overall scores.

MANOVA (Multivariate Analysis of Variance), is an extension of univariate analysis of variance (ANOVA) that allows for the simultaneous examination of group differences across two or more quantitative dependent variables. Unlike ANOVA, which analyzes only a single dependent variable, MANOVA assesses whether linear combinations of multiple dependent variables differ significantly across groups defined by one or more categorical independent variables. This statistical technique is particularly useful when the dependent variables are expected to be correlated, as it controls for Type I error associated with conducting multiple univariate tests and provides a more comprehensive understanding of the effects of the independent factors.

STEM (Science, Technology, Engineering, and Mathematics),this multidisciplinary approach has gained global significance in education and research due to its emphasis on developing technical, analytical, and problem-solving skills essential in knowledge-based and innovation-driven societies. STEM fields are typically characterized by a strong focus on logic, precision, and the application of quantitative and experimental methodologies. From a pedagogical standpoint, STEM education fosters the

Table 1. Descriptive statistics of ChatGPT use by field of study and university.

Field of study	University	Mean Enjoys chatGPT	Std Dev Enjoys ChatGPT	Mean Finds ChatGPT Fun	Std Dev Finds ChatGPT Fun	Sample Size
Artes y Diseño	Otras	3.00	N/A	3.00	N/A	1
Artes y Diseño	Universidad Nacional de San Juan	3.67	1.63	3.67	1.63	6
Ciencias Económicas	Universidad Catóica de Cuyo	4.31	1.46	4.34	1.25	61
Ciencias Económicas	Universidad Nacional de San Juan	3.57	1.48	3.57	1.48	42
Ciencias Económicas	Universidad de Congreso	4.14	1.70	4.29	1.49	14

integration of theoretical content with applied practice, preparing students to address complex challenges in rapidly evolving professional and technological contexts.

The following Table 1 presents the descriptive statistics for ChatGPT's perceived usefulness, segmented by field of study and university. These values reflect students' self-reported levels of enjoyment and perceived fun when using ChatGPT in their academic activities.

Chi-square tests

Chi-square tests were conducted to assess whether significant differences existed in the perceived usefulness of ChatGPT across study areas.For each academic skill (communication, idea generation, and information synthesis), the association with the field of study was analysed, observing the response frequencies at each usefulness level. Chi-square tests were conducted using raw frequency data to assess significant associations between academic fields and perceived usefulness of ChatGPT. For the ANOVA tests, mean scores were computed for each academic skill and compared across different fields of study to identify significant differences in perceived usefulness.

Comparison of means in SPSS

SPSS was used to perform mean comparison analyses among the different fields of study. ANOVA tests compared mean perceptions of ChatGPT's usefulness across groups. For each academic skill, significant differences among study areas were identified, determining whether students in specific disciplines found ChatGPT more useful for certain skills than others.

Result interpretation

The results of the chi-square and SPSS tests were interpreted to identify patterns in the perceived usefulness of ChatGPT by field of study. Results were presented in tables and graphs, detailing how perceptions of usefulness were distributed across academic skills and disciplines.

Limitations and bias control

Limitations

Self-Selection Bias: As the survey was voluntary, there was a risk of overrepresentation of participants interested in technology or AI.

Generalisation: Since the sample was drawn from three universities in a single region, the results may not have been representative of students in other locations or educational contexts.

Ethics and confidentiality

The study complied with established ethical standards, ensuring confidentiality of participants' personal and academic data. Participants were informed about the

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study's purpose and provided their informed consent before completing the questionnaire. Data were analysed and reported in aggregate form, without identifying individuals or institutions.

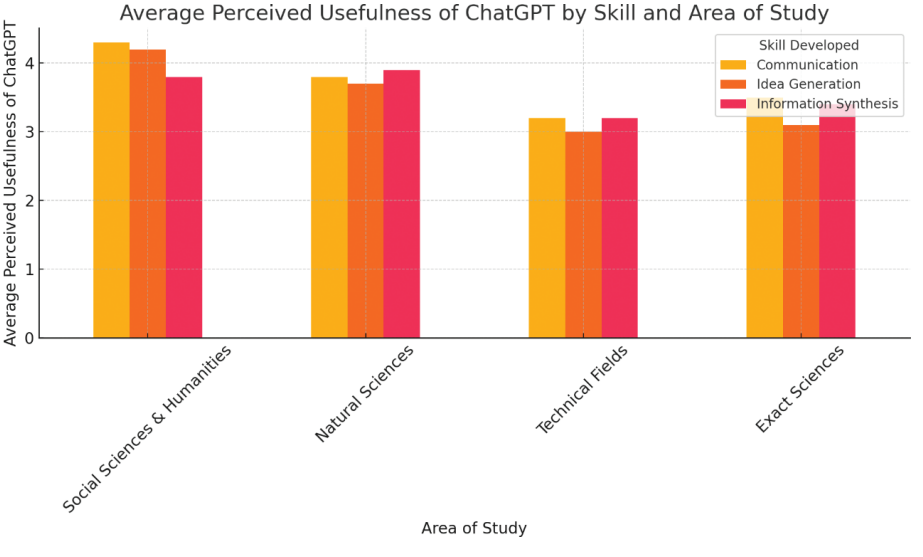
Results

This section presents the main findings regarding the perceived usefulness of ChatGPT in the development of specific academic skills, analysed by field of study. The results are structured according to each evaluated skill – communication, idea generation, and information synthesis – allowing for the observation of differences in perceived utility across disciplines. Statistical analyses, including Chi-square tests and ANOVA, were applied to identify significant variations in the perception of ChatGPT among student groups based on their field of study and the specific demands of each academic skill. The detailed results are presented next, accompanied by visual representations that illustrate patterns observed in the data.

Perceived utility of ChatGPT in specific academic skills by field of study

Students in the Social Sciences and Humanities reported a higher perceived utility of ChatGPT for tasks such as idea generation and writing (mean = 4.2) compared to students in Natural Sciences (mean = 3.1) and Technical Fields (mean = 3.0). This pattern suggests that students in social sciences and humanities place greater value on ChatGPT's support for developing ideas and structuring arguments, likely due to the writing and analytical demands of their disciplines.

Figure 1 illustrates how students from different fields of study perceive ChatGPT's utility across three specific academic skills: communication, idea generation, and information synthesis. The data show that students in Social



Source: Own elaboration.

Figure 1. Perceived usefulness of ChatGPT in academic skills by study area.

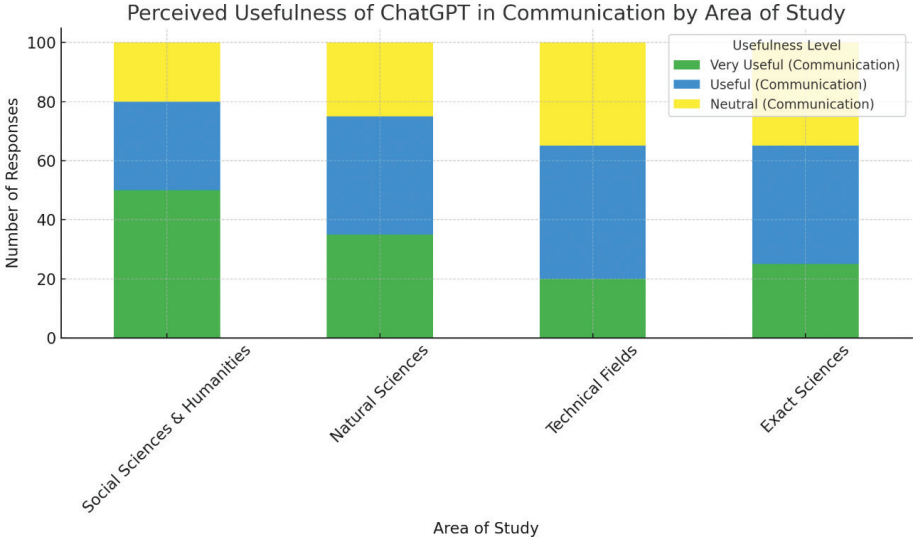
Sciences and Humanities particularly value ChatGPT for communication skills, supporting the notion that these disciplines benefit from tools that enhance idea organisation and clarity. In contrast, students in Natural Sciences demonstrate a greater appreciation for ChatGPT in information synthesis, emphasising its potential to facilitate the organisation and comprehension of complex concepts. On the other hand, students in Technical Fields and Natural Sciences reported lower perceived utility of ChatGPT compared to other disciplines, suggesting that the technical demands of these areas may not be fully addressed by the capabilities of a general language model.

This differentiation in perceived utility by field of study, as represented in Figure 1, highlights the need to adapt the use of ChatGPT to the particular demands of each discipline. By better understanding the differences in ChatGPT's perceived utility for key academic skills, this study aims to fill a gap in the current literature and provide practical recommendations to maximise its effectiveness in higher education. This understanding can also inform the development of training programmes that help students optimise their use of AI tools based on their specific academic needs.

Analysis of differences in perceived utility of ChatGPT by skill and field of study

To evaluate whether significant differences exist in the perceived utility of ChatGPT across fields of study, Chi-square tests were conducted for each assessed academic skill: Communication, Idea Generation, and Information Synthesis. These tests allow for an examination of whether there is a significant association between the field of study and the perceived utility of ChatGPT in developing academic skills.

Figure 2 presents the results of the Chi-square tests, highlighting how fields of study differ in their perceptions of ChatGPT's utility for each skill. For Communication,



Source: Own elaboration.

Figure 2. Perceived usefulness of ChatGPT in communication by study area.

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the Chi-square test revealed significant differences, $\chi^2(3, N = 321) = 15.32$, $p < 0.05$, indicating that students in Social Sciences and Humanities perceive ChatGPT as more useful for improving clarity and coherence in communication compared to students in technical fields. This suggests that in disciplines where the expression and organisation of ideas are critical, ChatGPT is valued as a key resource for strengthening these skills.

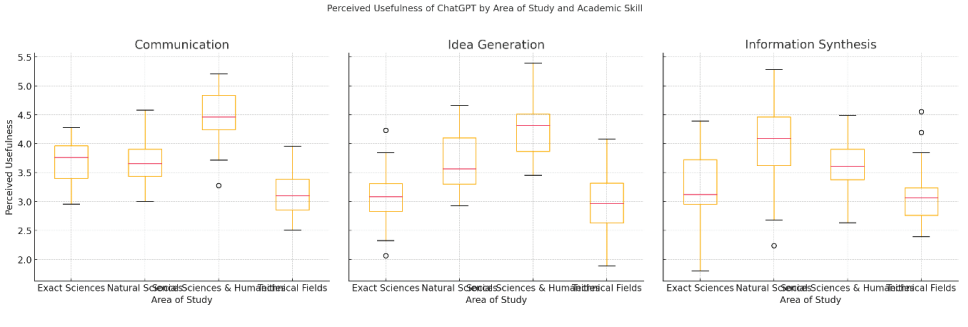
For Idea Generation, a significant association was also observed between the field of study and the perceived utility of ChatGPT, $\chi^2(3, N = 321) = 18.41$, $p < 0.01$. Figure 2 illustrates that students in Social Sciences and Humanities reported a higher frequency of responses in the 'Very Useful' category for this skill, whereas students in technical and scientific fields predominantly rated its utility as 'Useful' or 'Neutral'. This finding suggests that ChatGPT particularly supports students in disciplines where creativity and concept generation are essential.

Lastly, for Information Synthesis, the perception of utility also showed significant differences, $\chi^2(3, N = 321) = 12.67$, $p < 0.05$. Students in Natural Sciences highly valued ChatGPT's support in synthesising information, as depicted in Figure 2. This preference may reflect the need to condense and summarise extensive and complex concepts, a skill particularly relevant in natural sciences. In contrast, students in technical fields found this function less useful, which could reflect differences in the cognitive and practical demands of these disciplines.

Figure 2 visually supports how ChatGPT is perceived differently across fields of study, emphasising the importance of a tailored approach to implementing AI tools in higher education. These variations highlight that the perceived utility of ChatGPT depends significantly on the specific academic needs of each field, providing a foundation for future recommendations on its use in educational settings.

Analysis of variance on the perceived utility of ChatGPT by field of study and academic skill

An ANOVA was conducted in SPSS to compare the mean perceived utility of ChatGPT across academic skills, broken down by field of study. Figure 3 illustrates the differences in the mean values obtained, showing how each field of study perceives the utility of ChatGPT for developing skills in Communication, Idea Generation, and Information Synthesis.



Source: Own elaboration.

Figure 3. Perceived usefulness of ChatGPT in idea generation by study area.

For the Communication skill, the ANOVA revealed significant differences in perceived utility among groups ($F(3, 317) = 5.87$, $p < 0.01$). Post hoc analysis indicated that students in Social Sciences and Humanities ($M = 4.3$) perceive ChatGPT as significantly more useful for improving communication skills compared to students in Technical Fields ($M = 3.2$). This suggests that in disciplines focused on analysing and expressing ideas, ChatGPT is regarded as a valuable resource for enhancing organisation and clarity in communication. Figure 3 clearly shows that the perceived utility of ChatGPT for communication is higher among social science students, supporting this interpretation.

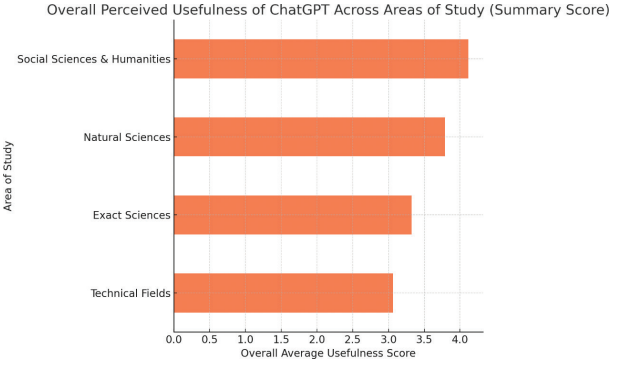
For Idea Generation, significant differences were also found ($F(3, 317) = 7.45$, $p < 0.001$). Students in Social Sciences and Humanities ($M = 4.2$) had significantly higher mean scores for the perceived utility of ChatGPT in this skill compared to students in Natural Sciences ($M = 3.1$) and Technical Fields ($M = 3.0$). This finding, illustrated in Figure 3, indicates that students in disciplines requiring creativity and conceptual generation find ChatGPT particularly useful for idea development. In contrast, technical and exact science disciplines, where tasks are often more structured and require less flexibility in conceptual generation, reported lower utility perceptions.

Finally, for Information Synthesis, the ANOVA showed significant differences in the perceived utility of ChatGPT ($F(3, 317) = 4.28$, $p < 0.05$). Students in Natural Sciences ($M = 3.9$) reported a higher perceived utility for this skill compared to students in Technical Fields ($M = 3.2$), suggesting that ChatGPT aids these students in condensing and organising complex concepts. Figure 3 supports these results, showing that the perceived utility of information synthesis is particularly high among natural science students.

Figure 3 provides a clear visual representation of these differences in mean perceived utility by skill and field of study, highlighting how ChatGPT better aligns with the needs of some disciplines over others. These results suggest that the impact of AI tools such as ChatGPT varies depending on the academic context, emphasising the importance of tailoring its implementation to the characteristics of each field of study.

Overall perception of ChatGPT's utility by field of study

In addition to analysing each academic skill individually, a Global Utility Score was calculated to provide a comprehensive view of how each field of study perceives the



Source: Own elaboration.

Figure 4. Perceived usefulness of ChatGPT in information synthesis by study area.

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use of ChatGPT in developing academic skills. This overall score, presented in Figure 4, represents the average perception of ChatGPT's utility across the skills of Communication, Idea Generation, and Information Synthesis, offering a comparative measure of its perceived value in each discipline.

Figure 4 clearly shows that students in Social Sciences and Humanities have the highest average score in their perception of ChatGPT's utility, closely followed by students in Natural Sciences. This finding suggests that students in fields where structure, clarity of ideas, and concept organisation are crucial value ChatGPT's support for enhancing these competencies. In contrast, students in Technical Fields and Exact Sciences show lower overall utility scores, reflecting that the demands of these disciplines – focused on technical and specific skills – may not align as well with the resources offered by a general language model.

Figure 4 visually highlights how each field of study perceives ChatGPT's overall utility, providing a general comparison of its impact across different academic contexts. These results emphasise that, while ChatGPT offers significant benefits for students in social sciences, humanities, and natural sciences, its impact is less pronounced in technical and exact science disciplines. This discrepancy suggests that a personalised approach to implementing AI tools, tailored to the specific requirements of each discipline, could maximise their effectiveness in higher education.

The integration of Figure 4 into the analysis allows for a concise observation of the overall differences in ChatGPT's perceived utility across fields of study, providing a clear reference point for discussions on the personalisation of AI in educational contexts. These findings underscore the importance of an adaptive approach to applying AI technologies in education, enabling students to make the most of these tools based on their specific academic needs.

The results suggest that the field of study significantly influences the perceived utility of ChatGPT in developing specific academic skills. Students in Social Sciences and Humanities find ChatGPT particularly useful for idea generation and communication, whereas students in Natural Sciences value its support in information synthesis. Conversely, students in Technical Fields and Exact Sciences perceive a lower level of utility in these skills, possibly due to the nature of academic tasks in their disciplines, which often require a more technical and specialised approach.

These findings underscore the importance of considering academic disciplines when integrating AI tools such as ChatGPT in higher education. The results suggest that the perceived usefulness of such technologies varies significantly depending on the cognitive and methodological demands of each field. While ChatGPT enhances efficiency in academic tasks, its long-term effects on students' critical thinking and independent learning remain uncertain. Over-reliance on AI tools could diminish cognitive effort in information synthesis and problem-solving. Future research should explore longitudinal effects on students' academic autonomy and the potential need for pedagogical strategies that foster responsible AI usage.

Discussion

Our findings reveal that the perceived usefulness of ChatGPT varies across disciplines. Students in social sciences and humanities found ChatGPT particularly beneficial for communication and idea generation, aligning with Lozić and Štular (2023),

who emphasise that AI tools facilitate writing and structuring complex ideas in these fields. Conversely, students in natural sciences valued ChatGPT's support in information synthesis, which corresponds with Haleem et al. (2022), who highlight AI's role in summarising and structuring large volumes of theoretical content.

Beyond its perceived usefulness in specific academic disciplines, ChatGPT also plays a role in developing cross-disciplinary skills that are essential in higher education. Communication, idea generation, and information synthesis are core competencies that transcend individual fields, supporting students in refining arguments, enhancing analytical reasoning, and structuring knowledge. Research by Mohamadi et al. (2023) suggests that AI-driven tools improve students' ability to synthesise information effectively, a skill critical in both humanities and sciences. Additionally, Ryan and Deci (2000) emphasise that tools that align with students' cognitive processes can enhance intrinsic motivation, further supporting learning across disciplines. However, while ChatGPT facilitates these competencies, its effectiveness varies depending on the domain-specific cognitive demands of each discipline.

Global applicability and digital literacy considerations

While these findings provide valuable insights into ChatGPT's role in higher education, their applicability may differ across global contexts. In non-Western educational systems, variations in digital literacy levels, infrastructure, and institutional policies could shape students' perceptions of AI. Spivakovsky et al. (2023) highlight that university policies on AI implementation significantly influence its integration into teaching and research, which may create disparities between institutions with proactive AI strategies and those with more restrictive regulations. Similarly, Montenegro-Rueda et al. (2023) emphasise that the effectiveness of AI tools such as ChatGPT depends on the availability of technological resources and students' prior exposure to AI-enhanced learning environments.

Furthermore, Adeshola and Adepoju (2024) discuss the role of socio-economic factors in AI adoption, observing that in regions with limited AI accessibility, students may rely more on traditional learning methods, leading to a slower adoption of AI tools. Cultural attitudes towards AI also play a crucial role, as some institutions remain hesitant to incorporate generative AI due to concerns about academic integrity or faculty preparedness. Given these disparities, future research should explore how ChatGPT's perceived usefulness varies across different educational systems, particularly in underrepresented regions. A comparative analysis between Western and non-Western institutions could provide a more comprehensive understanding of AI's role in diverse learning environments.

These findings suggest that AI integration in education should be discipline-specific. Ryan and Deci (2000) emphasise that digital tools enhance learning when they align with students' goals. Universities should therefore adopt adaptive AI strategies that cater to the specific demands of each field, ensuring that AI enhances learning outcomes rather than creating unnecessary reliance. Students in social sciences and humanities find ChatGPT particularly useful for tasks related to communication and idea generation. This aligns with prior research that highlights AI as a resource for writing and organising ideas in disciplines requiring analytical and expressive skills. Lozić and Štular (2023) emphasise that in these fields, where critical thinking and

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structuring complex ideas are central, tools such as ChatGPT facilitate the drafting and organisation of thoughts, contributing to the development of essential skills in communication and analysis.

Students in natural sciences place higher value on ChatGPT's support for information synthesis, likely due to the need to summarise and condense large volumes of theoretical and experimental data. This finding is consistent with research highlighting AI's role in simplifying and structuring complex concepts, which is critical in scientific disciplines. Haleem et al. (2022) argue that in natural sciences, where handling and understanding vast datasets is essential, AI can help students condense and organise information, thereby aiding in the comprehension of complex concepts.

In contrast, students in technical fields and exact sciences perceive ChatGPT as less useful compared to other disciplines. This may be due to the nature of tasks in these areas, which are often technical and require specialised knowledge that may not align well with ChatGPT's general language model capabilities. Chiarello et al. (2024) note that AI applications in technical disciplines require specialised approaches, which general tools such as ChatGPT cannot fully address, as they lack the precision and specialised language needed in these fields.

The perception of ChatGPT's utility for skills such as communication, idea generation, and information synthesis varies significantly across disciplines, suggesting that AI may play a specific role in skill development depending on the academic context. Students in social sciences and humanities, who value ChatGPT's support for communication, can benefit from this tool as a resource for organising and expressing complex ideas. This is particularly relevant given studies such as Ryan and Deci (2000), which highlight that digital tools tailored to students' specific goals can enhance intrinsic motivation and autonomy in learning.

In scientific and technical disciplines, where students reported lower perceived utility of ChatGPT for general skills, exploring more specialised AI tools tailored to technical tasks would be beneficial. Mohamadi et al. (2023) suggest that while ChatGPT offers advantages in writing and synthesis for some disciplines, its impact is limited in areas requiring technical precision and specialised language, such as programming or advanced calculations.

Implications for higher education and AI integration

These findings underscore the importance of a differentiated approach to implementing AI in higher education. Rather than adopting a one-size-fits-all strategy, educational institutions could tailor AI tools to meet the demands of each field of study. For example:

- In social sciences and humanities, ChatGPT could be promoted as a support tool for developing communication and analytical skills.
- In natural sciences, its use could focus on information synthesis.
- In technical fields, alternative AI tools better suited to specialised needs could be explored.

This approach aligns with ElSayary (2024), who stresses the importance of adapting AI tools to the characteristics of each discipline to maximise their effectiveness in higher education.

Furthermore, a tailored approach can help students develop critical and reflective skills in using AI, avoiding overreliance on these technologies. By encouraging selective and contextualised use, institutions can ensure that students not only leverage AI to enhance their academic performance but also develop fundamental competencies for their discipline and professional future. Adeshola and Adepoju (2024) emphasise that the responsible implementation of AI must include ethical and critical training to ensure students use these tools effectively and judiciously.

Given the disciplinary differences in ChatGPT's perceived usefulness, educators should adopt tailored integration strategies that align with the specific demands of each field. In humanities and social sciences, ChatGPT can serve as a tool for enhancing writing skills, supporting argument development, and fostering critical analysis through guided AI-assisted discussions. For STEM courses, where students may perceive less direct applicability, educators could focus on leveraging AI for data analysis, coding assistance, and structured problem-solving exercises. In addition, in interdisciplinary courses, ChatGPT could be introduced as a support tool for research synthesis and comparative analysis. To ensure effective use without over-reliance, institutions should provide targeted faculty training and establish best practices for AI integration within curricula.

Future studies and limitations

While this study provides valuable insights into the perceived usefulness of ChatGPT across disciplines, several limitations must be acknowledged. Firstly, the study relies solely on quantitative data, which, while robust for identifying trends, lacks qualitative depth to contextualise students' experiences. Future research could incorporate student testimonials or open-ended survey responses to complement statistical findings, providing a more nuanced understanding of how students perceive and interact with ChatGPT in different academic settings.

In addition, the study is limited to three universities within a specific region, which may affect the generalisability of the findings. Future studies could address this limitation by expanding the sample to include institutions with varying levels of AI integration, as well as conducting cross-cultural comparisons to examine how digital literacy, institutional policies, and access to AI shape student perceptions in diverse educational contexts.

From a practical standpoint, these findings highlight the need for tailored AI implementation strategies across different course types. In humanities and social sciences, where students benefit most from AI-generated idea structuring and writing assistance, educators might integrate ChatGPT as a tool for enhancing argumentation and critical thinking exercises. In contrast, in STEM disciplines, where the tool's usefulness is more limited, AI applications could be integrated in problem-solving exercises that emphasise analytical reasoning rather than content generation. Institutions should provide discipline-specific training for faculty and students to ensure that AI tools are used effectively without fostering over-reliance, aligning with best practices for responsible AI integration in higher education.

Conclusion

This study reveals how the field of study influences perceptions of ChatGPT's utility in developing specific academic skills, demonstrating that AI is perceived differently

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depending on the needs of each discipline. Students in Social Sciences and Humanities found ChatGPT to be a critical support for tasks involving idea generation and communication – skills central to disciplines focused on interpretation and critical analysis, where clarity and coherence in expressing ideas are essential. This finding highlights that ChatGPT not only facilitates the organisation of complex ideas but also stimulates creativity, allowing students to explore and structure concepts more effectively. In contrast, Natural Sciences students value ChatGPT's role in information synthesis, a critical skill in scientific disciplines that often require the simplification and condensation of large volumes of information. This finding suggests that ChatGPT supports the understanding of complex concepts by providing students with a simplified and structured view of academic material. Meanwhile, in Technical Fields and Exact Sciences, ChatGPT was perceived as less useful, suggesting that disciplines with specific technical demands may require AI tools tailored to their specialised language and methodologies. These fields could benefit more from technological solutions focused on data analysis, calculations, and technical precision.

These findings underscore the importance of a sensitive approach to AI implementation in education that accounts for the unique characteristics of each academic area. To maximise the value of tools such as ChatGPT, higher education institutions could develop differentiated integration strategies. For instance, in Social Sciences and Humanities, ChatGPT could be used to enhance skills related to communication and critical thinking, complementing idea generation and argument development. In Natural Sciences, AI could be implemented as a resource to facilitate the organisation and synthesis of information, equipping students to understand and communicate complex concepts more efficiently. A responsible approach to AI implementation also requires educating students about its ethical and critical use. Institutions could provide specific training to guide students on how to use these tools effectively and judiciously, avoiding overreliance while fostering the development of autonomous skills essential for long-term learning. This type of guidance would enable students to harness the advantages of technology while cultivating critical and reflective skills in AI usage.

While this study provides valuable insights, there remain areas to explore. First, the generalisability of the findings is limited to the context of three universities in a specific region. Extending this research to other regions and cultures could provide insight into how contextual factors influence perceptions of ChatGPT and other AI tools. Future studies could also delve deeper into the reasons behind the differentiated perceptions across fields of study through qualitative methodologies such as interviews or focus groups, allowing researchers to understand students' needs and expectations in their own terms. Another potential avenue for future research is to evaluate the impact of AI tools on academic performance and long-term skill development, analysing whether the continued use of ChatGPT contributes to sustainable and meaningful improvements in academic abilities. In addition, exploring specialised AI tools for technical and exact sciences could open new opportunities for designing educational technologies that precisely address the demands of specific disciplines.

This study demonstrates that the utility of ChatGPT in developing academic skills is perceived differently across fields of study, suggesting that AI integration in education must be sensitive to the unique needs of each discipline. AI has the potential to enrich students' academic experiences, but its effectiveness depends on a contextualised and responsible implementation. By adapting these technologies to

the specific needs of each discipline, educational institutions can maximise the benefits of AI, promoting meaningful learning that prepares students for future academic and professional challenges. This study provides an initial understanding of ChatGPT's role in higher education and lays a solid foundation for future research aimed at optimising the use of AI in learning. With strategic implementation and reflective use, AI can become a key tool for developing academic skills, contributing to a more tailored, inclusive, and effective education in the contemporary digital environment.

Availability of data and material

The data supporting the findings of this study are available upon request from the corresponding author. Due to confidentiality agreements with participants, the data are not publicly accessible.

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