

# Use of ChatGPT as a study and teaching complementary tool in the medical course\*<sup>1</sup>

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## Abstract

The Coronavirus pandemic has driven the integration of technology on the education, boosting the remote teaching and online learning. In this context, Artificial Intelligence (AI), especially ChatGPT, began to be used in the medical field for research and information analysis, representing a technological innovation. The main goal of this research was to identify the applicability of ChatGPT as a study and teaching complementary tool among medical students. This is a quantitative and descriptive study, carried out with 201 medical students from the Regional University of Blumenau and approved under CAAE 73891623.4.0000.5370. The data has been collected through a structured questionnaire and analyzed descriptively along three axes: (1) Students' perception about ChatGPT; (2) Use of ChatGPT as a complementary study tool; (3) Use of ChatGPT as a complementary teaching tool. The results show that 76.6% of the students use ChatGPT as a tool to support their studies, seeking to comprehend complex concepts, elaborate abstracts/annotations and solve problematic situations. The frequency of use of ChatGPT by teachers is low, and the students suggest that the tool could be used to clarify doubts, clinical cases and stimulate reasoning, aiming the student's autonomy. However, using this instrument without assessing the quality of the information may compromise students' capacity for critical analysis. In addition, guaranteeing the reliability of the references, preventing plagiarism and promoting ethics in the use of AI are fundamental concerns.

## Keywords

Medical education – Artificial Intelligence – ChatGPT Teaching-Learning tool.

\* English version by Henrique Borges Pereira. The authors take full responsibility for the translation of the text, including titles of books/articles and the quotations originally published in Portuguese.

**1-** Data availability: the entire data set supporting the results of this study has been published in the article itself.

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<https://doi.org/10.1590/S1678-4634202551288875en>

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## Introduction

During the Coronavirus Disease (Covid-19) pandemic, which persisted for just over three years, strategies such as social isolation and physical distancing were essential to mitigate the spread of the virus. The adoption of these measures significantly accelerated the integration of technology into education, transforming learning dynamics and facilitating the global transition from in-person to remote teaching.

The absence of in-person interaction between teachers and students necessitated the adoption of a customized and proactive approach to the use of technology. Various methods were implemented globally, ranging from classes broadcast via television to platforms specifically designed for conducting lessons and facilitating online activities (Vieira; Ricci, 2020). These adaptations were motivated by the need to guarantee the continuity of education, despite the isolation of the students. As a result, it became essential to provide new resources and tools to enhance the teaching and learning process, including in medical education programs.

In this context, Artificial Intelligence (AI) applications and their functionalities have gained significant prominence, not only among students but also among teachers. According to Barbosa and Portes (2023), AI enables the simulation of human-like intelligence, allowing machines to make autonomous decisions (based on patterns derived from various databases) rather than merely executing preprogrammed commands. In this way, machines are able to analyze, reason and make decisions logically.

In the field of medicine, Artificial Intelligence (AI) plays a pivotal role in advancing innovative tools and technologies to improve healthcare approaches. By analyzing data and algorithms defined by specialists, AI becomes capable of proposing solutions to healthcare challenges, fostering research opportunities across various domains, including predictive analytics, precision medicine, virtual diagnostics, and patient monitoring (Lobo, 2017).

Notably on the rise, ChatGPT serves as an example of Artificial Intelligence (AI) that represents a chatbot (program designed to simulate human conversation) prototype. Based on a language model developed by OpenAI, an AI research organization renowned for its innovations in the field, ChatGPT was launched in November 2022 as part of the Generative Pre-trained Transformer (GPT) family. To train its models on a wide range of textual data and ensure the generation of accurate responses, OpenAI leverages diverse sources, including internet content, books, and scientific articles. The company also employs the Transformer architecture, which utilizes attention mechanisms to assess the relevance of each word, enabling the model to understand context and generate coherent text<sup>3</sup>.

Therefore, ChatGPT represents a valuable tool for complementing the teaching and learning process in the medical field. It can assist students by addressing their questions, providing explanations of additional concepts, and offering practical examples. Furthermore, ChatGPT can simulate interactive dialogues with various patient profiles, enhancing communication skills through facilitated access to relevant information (Amri; Hisan, 2023).

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**3-** Available at: <https://chat.openai.com/>. Accessed on: July 6th, 2023.

Nevertheless, the use of ChatGPT as a supplementary resource for academic studies also presents certain challenges. These include the need for critical evaluation of the quality and reliability of information, the risk of excessive reliance on technology at the expense of human learning, and concerns regarding the potential replacement of human professionals with machines in the medical field. In this context, the role of educators becomes crucial in guiding students to develop analytical skills. Addressing these challenges requires a deeper understanding of ChatGPT's influence on the teaching and learning process, contributing to mitigating and demystifying these concerns.

With the objective of offering a fresh perspective on the introduction of technological innovations in medical education and addressing the growing need to prepare future professionals for an increasingly technological job market, this research seeks to answer the following question: How can ChatGPT be utilized as a complementary tool for studying and teaching in medical education? Accordingly, the study aims to identify the applicability of ChatGPT as a supplementary resource for medical students' learning and instruction. Additionally, it seeks to capture students' perceptions of ChatGPT's use, providing insights to support educators in enhancing their teaching practices within the medical curriculum.

Existing literature underscores the transformative potential of Artificial Intelligence (AI) within medical education, particularly in institutions that have already begun to embrace these technologies. Dal Sasso *et al.* (2024) emphasize that AI can facilitate active learning, fostering personalized learning experiences and providing real-time feedback. Furthermore, Breeding *et al.* (2023) demonstrate that ChatGPT assists students in comprehending complex concepts. However, a significant gap persists in the practical integration of these technologies, especially in countries like Brazil, where resistance to the adoption of novel methodologies may be more pronounced.

## Methodology

This study adopts a descriptive design with a quantitative approach and was conducted at the Regional University of Blumenau (FURB), located in Blumenau, Santa Catarina, Brazil. Established in 1990, FURB's medical program has significantly contributed to the training of medical professionals in the region, advancing healthcare education and fostering research across various medical specialties.

All 486 medical students enrolled at FURB were invited to participate in the study. Inclusion criteria required participants to be enrolled in any of the 12 phases of the medical program. Exclusion criteria included being under 18 years of age at the time of the survey or submitting questionnaires that were incorrectly or incompletely filled out.

Data collection occurred between October and November 2023 using a structured, author-developed form comprising closed-ended questions and made available online. The questionnaire addressed topics such as prior knowledge of ChatGPT, perceptions of its utility in the medical field, personal experiences with the tool, areas of study where ChatGPT may be most effective, and concerns regarding the reliability of the information, among others. To assess students' perceptions of the tool's potential benefits, a Likert scale ranging from zero to five was employed to measure the degree of agreement.



The questionnaire responses were transcribed and subjected to descriptive analysis using Microsoft® Excel software to quantify the data obtained. This approach provided an organized overview, enabling the identification of patterns and key characteristics within the data (Marconi; Lakatos, 2017). Frequencies and averages of the responses were evaluated to better understand students' perceptions of ChatGPT as a complementary tool for studying and teaching in the medical program.

The responses were categorized and presented across three main axes: (1) Students' perceptions of ChatGPT; (2) Utilization of ChatGPT as a Complementary Tool for studying; and (3) Utilization of ChatGPT as a Complementary Tool for teaching. In adherence to ethical principles, this study complied with the guidelines of Resolution 466/2012 of the National Health Council (Brazil, 2012) and received approval under CAAE 73891623.4.0000.5370.

## Results

Among the 201 medical students from FURB who participated in the survey, 27.9% were identified as male, while 72.1% were identified as female. Regarding the phase of their studies, 32.3% were in the basic cycle, 45.8% in the clinical cycle, and 22% in the clinical clerkship. Concerning age distribution, 29.4% of participants were between 18 and 20 years old, 53.7% were between 21 and 25 years old, 8.9% were between 26 and 30 years old, and 7% were between 31 and 40 years old.

### Perceptions of the students of Artificial Intelligence and ChatGPT

Regarding knowledge of AI, all participants reported being familiar with the term. Among them, 62.7% claimed to have a good understanding of the concept, while 37.3% indicated having limited knowledge of the subject. With respect to ChatGPT, most of the students learned about the platform through colleagues (48.8%) and social media or the internet (33.5%), while the direct influence of teachers was less significant (6.7%). Additionally, 11% of the participants discovered ChatGPT independently, highlighting individual initiatives by some students to seek out complementary learning resources.

Regarding the use of ChatGPT as a support tool for studying, 76.6% of participants reported utilizing the platform for this purpose. However, perceptions of its utility varied among students: 6.5% considered ChatGPT to be not very useful, 16.3% rated it as moderately useful, 25.4% as useful, 23.4% as very useful, and 5.5% as extremely useful. Conversely, 22.9% of participants indicated that they do not use ChatGPT for learning purposes.

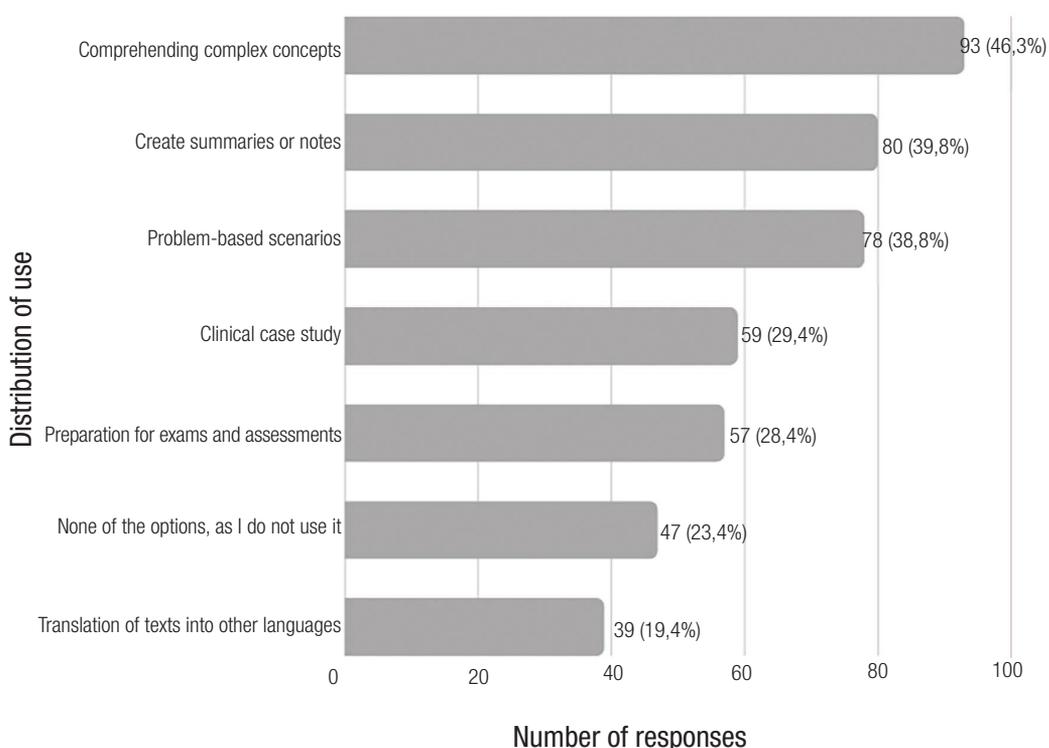
Furthermore, regarding the reliability of information provided by ChatGPT in the medical context, 75% of participants believe that the data is sometimes reliable, 9.5% report trusting the information obtained, and 15.5% express a lack of trust. When asked about their perception of ChatGPT's potential to aid in the development of research and analytical skills, the majority of students (75.9%) consider the tool to be useful, while 24.1% hold a contrary view.



## Using ChatGPT as a complementary study tool

Regarding the various situations in which students utilize ChatGPT, the Chart 1 illustrates that the tool is predominantly used by medical students as a resource for understanding concepts, with 46.3% of participants employing it for this purpose. This is followed by 39.8% who use it to create summaries or notes and 38.8% who rely on it for solving problem-based scenarios. A smaller portion of respondents (23.4%) reported not using ChatGPT for any of the mentioned purposes.

**Chart 1** - Distribution of the use of ChatGPT as a study support tool during the course



Source: Survey data.

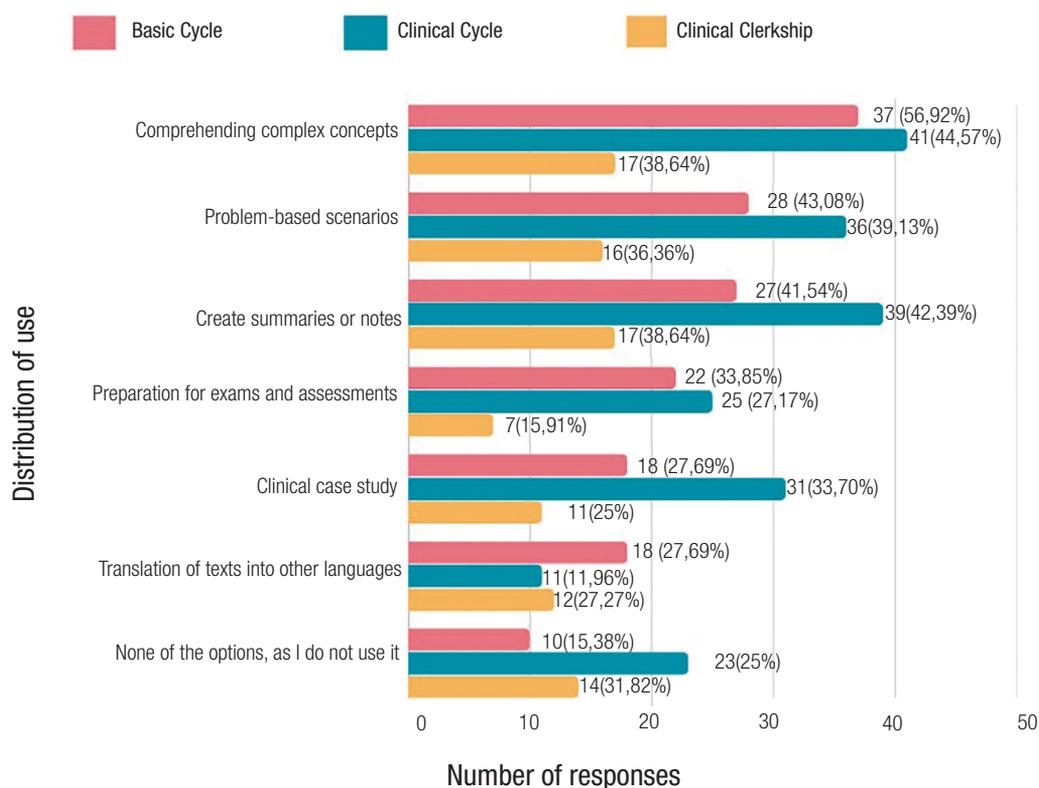
Data on ChatGPT usage frequency among medical students reveals diverse utilization patterns. A significant proportion of students (41.8%) reported monthly use of the platform. Conversely, 30.3% of respondents indicated minimal or no utilization, while 26.4% reported weekly use. Daily usage was observed in a small minority of students (1.5%).

Graph 2 provides insights into the specific applications of ChatGPT across different stages of the medical curriculum: the basic cycle, the clinical cycle, and the clinical clerkship. In the basic cycle, 56.9% of students primarily employed ChatGPT for comprehending complex concepts, followed by 43% who utilized it for problem-solving. Within the clinical cycle, comprehending complex concepts remained the most frequent application



(44.5%), followed by summarizing or annotating information (42.3%). Similarly, in the clinical clerkship phase, comprehending complex concepts (38.6%) and summarizing or annotating information (38.6%) were the most common applications of ChatGPT.

**Graph 2 -** Distribution of ChatGPT use as a study support tool by course cycle



Source: Survey data.

When asked about the potential of ChatGPT to enhance understanding and performance in undergraduate medical courses, 39.8% of participants indicated that the platform could significantly contribute to the assimilation of content that was previously taught but not fully absorbed. Additionally, 16.4% believed that ChatGPT contributes substantially, while 21.4% considered its contribution to be moderate, and 2.5% rated it as extremely beneficial. Conversely, 16.4% of respondents felt that the tool offered minimal contribution, and a minority of 3.5% believed the platform provided no value in terms of improving their comprehension and performance.

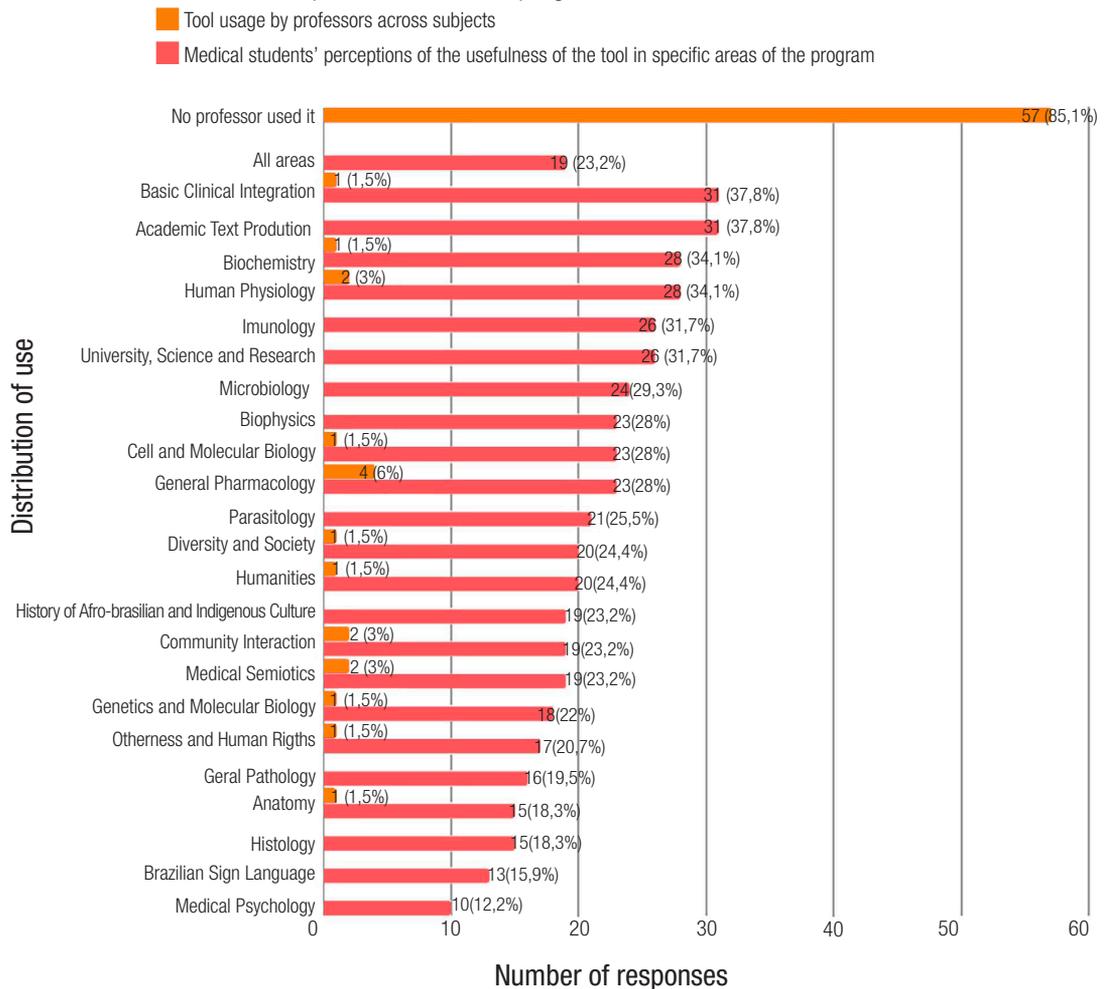
### Using ChatGPT as a complementary teaching tool

The analysis of data concerning the use of ChatGPT as a teaching tool within the medical program revealed limited adoption among professors. In the basic cycle, 85.1%



of respondents reported that none of their teachers had employed this technology (Chart 3). Among the faculty members who had utilized ChatGPT, perceptions of its effectiveness varied: 16.7% considered it highly effective, 46.7% moderately effective, 33.3% minimally effective, and 3.3% deemed it entirely ineffective. Notably, none of the students rated the tool as very effective or extremely effective.

**Chart 3** – Use of ChatGPT by teachers of the Basic Cycle subjects and the medical students' perception of the usefulness of the tool in specific areas of the program



Source: Survey data.

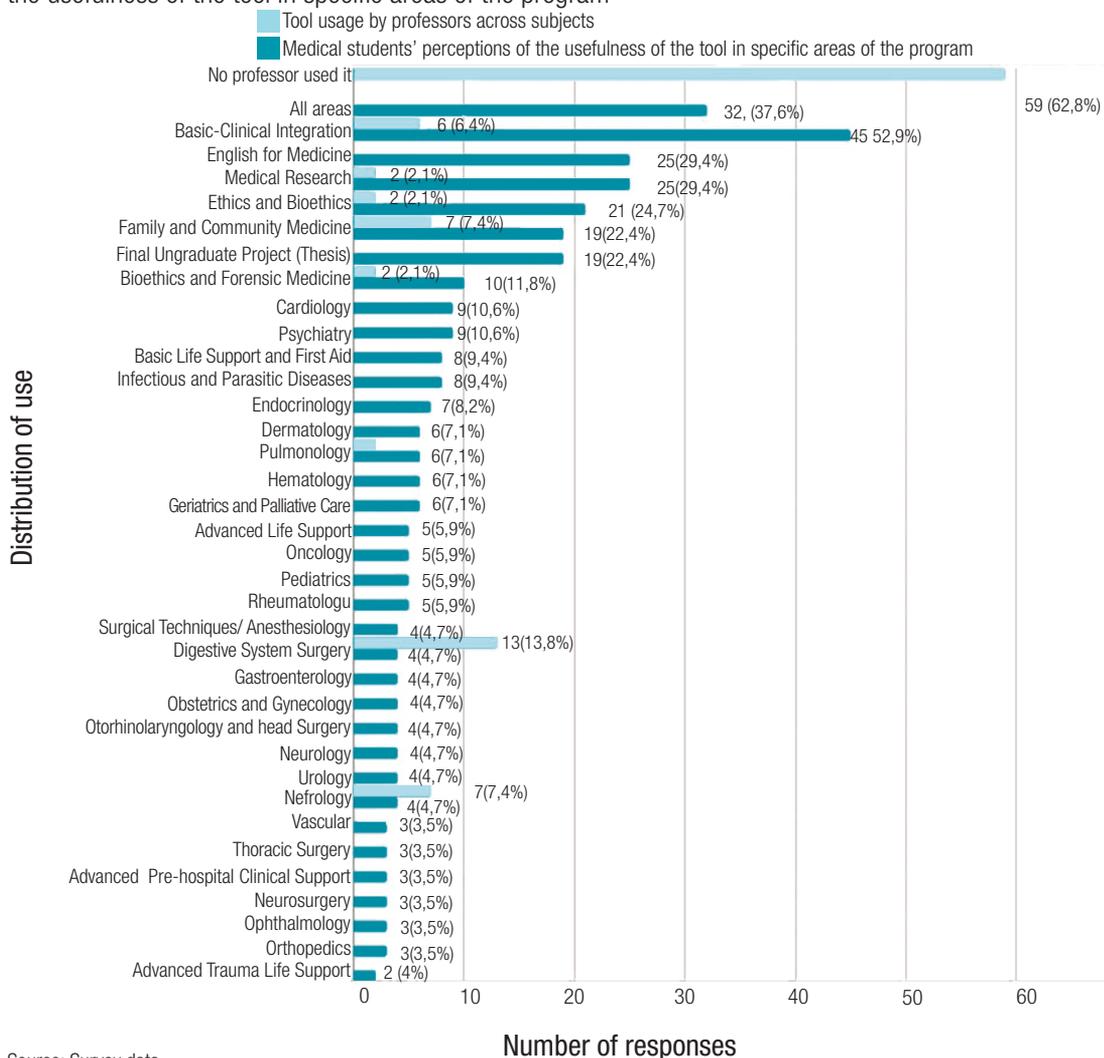
When asked about the subjects in which ChatGPT could be applied (Chart 3), 'Basic-Clinical Integration' and 'Academic Textual Production' were the most frequently mentioned, each cited by 37.8% of participants. Additionally, only 23.2% of respondents believed that ChatGPT could be incorporated into the teaching process across all subjects in the basic cycle.



In the clinical cycle, the adoption rate of ChatGPT remains low, with 62.8% of participants indicating that none of their instructors had employed the tool (Chart 4). Nonetheless, this cycle exhibited a comparatively higher usage rate than the others. The most frequently cited subjects in which ChatGPT was utilized included “Digestive System Surgery” (13.8%), “Family and Community Medicine” (7.4%), and “Nephrology” (7.4%).

Among the respondents who reported having used the tool, 18.9% evaluated it as quite useful, 13.5% as very useful, 37.9% as moderately useful, 24.3% as minimally useful, and 5.4% as completely ineffective. Notably, no students rated it as extremely effective. Furthermore, Chart 4 indicates that 37.6% of students believe ChatGPT could be applied across all areas of the clinical cycle, with particular emphasis on the subjects ‘Clinical Integration’ (52.9%), ‘English for Medicine’ (29.4%), and ‘Medical Research’ (29.4%).

**Chart 4 – Use of ChatGPT by professors of Clinical Cycle subjects and the medical students’ perception of the usefulness of the tool in specific areas of the program**

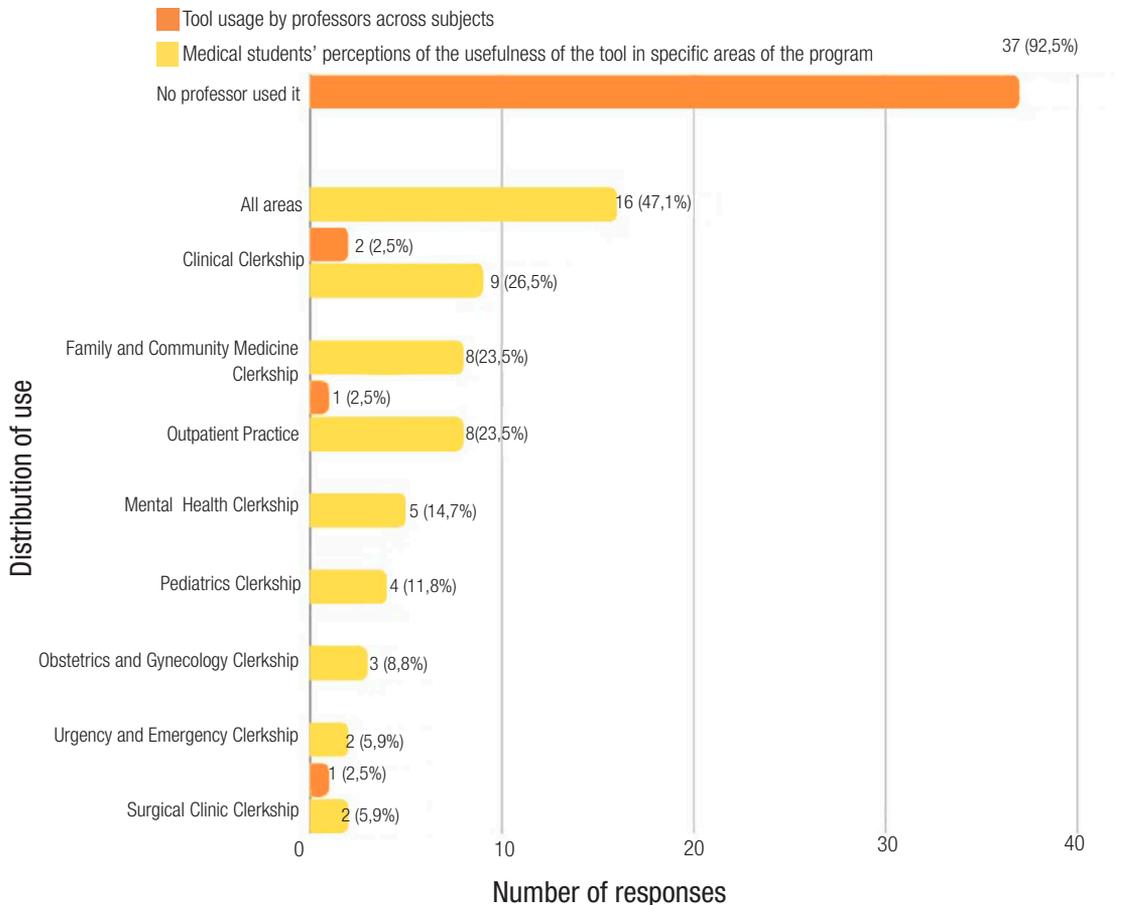


Source: Survey data.



In the clinical clerkship, 92.5% of students reported that instructors do not utilize the tool (Chart 5). Among those who indicated its use, the following clerkship areas were cited: Clinical Practice (5%), Outpatient Practice (2.5%), and Surgical Clinic (2.5%). Regarding perceptions of effectiveness among students who experienced the use of ChatGPT by professors, 5.9% considered it completely ineffective, 35.3% minimally useful, 29.4% moderately useful, 17.6% quite useful, 5.9% very useful, and 5.9% extremely useful. Additionally, 47.1% of clerkship students believed that the platform could be integrated into all areas of the clerkship, with particular emphasis on 'Clinical Clerkship' (26.5%) and 'Family and Community Medicine Clerkship' (23.5%).

**Chart 5** – Use of ChatGPT by professors of Clerkship subjects and the students' perception of the usefulness of the tool in specific areas of the program



Source: Survey data.

The investigation into how students' interactions with ChatGPT could be leveraged by instructors to enhance engagement and foster more active participation in medical education revealed varied perceptions across different phases of the program. In the basic



cycle, 57.3% of students indicated that such interactions could help identify common questions, 43.9% said they could be used to explore the use of clinical cases, and 37.8% pointed out that the use of the tool could stimulate clinical reasoning. Additionally, 45.1% of respondents acknowledged the benefits of personalized learning, while 24.4% emphasized the value of incorporating games as educational tools.

In the clinical cycle, responses were more diverse. While the identification of common questions (41.2%) and the exploration of clinical cases (44.1%) remained key priorities, a significant portion of students (20.6%) expressed the view that ChatGPT should not be utilized. Moreover, the promotion of student autonomy (23.5%) and the stimulation of clinical reasoning (44.1%) were also considered important. However, 2.9% of respondents expressed skepticism regarding the use of ChatGPT as an educational resource.

In the clerkship, responses were similar, with 56.5% highlighting the identification of common questions, 52.9% the exploration of clinical cases, and 49.4% the stimulation of clinical reasoning. Learning personalization (38.8%) and the promotion of autonomy (28.2%) were also considered important by some students.

When asked whether interacting with ChatGPT could help them develop clinical reasoning and problem-solving skills, responses were similar across the three cycles. The results show that 11.8% of students believe ChatGPT could definitely help, while 50.4% consider it could help to some extent. However, 31% of respondents expressed uncertainty, and 6.7% completely disagreed with this statement.

Finally, most students expressed skepticism regarding the complete replacement of traditional teaching methods by ChatGPT: 86.6% in the basic cycle, 85.9% in the clinical cycle, and 94.1% in the clerkship. On the other hand, 12.2% of respondents in the basic cycle, 11.8% in the clinical cycle, and 5.9% in the clerkship believe that ChatGPT can complement traditional teaching, but not fully replace it. Only 3.6% of students – 1.2% in the basic cycle, 2.4% in the clinical cycle, and none in the clerkship – believe in the possibility of fully replacing traditional teaching methods with AI, particularly ChatGPT.

## Discussion

The results of this study are consistent with the existing literature, which suggests that the adoption of AI tools such as ChatGPT can facilitate, among other aspects, the understanding of complex concepts (Breeding *et al.*, 2023). However, as also noted by Dal Sasso *et al.* (2024), the effective implementation of this technology still faces challenges related to students' trust in the quality of the information and the need for adequate pedagogical training for instructors, as reflected in the participants' perceptions in this study.

### Students' perceptions of AI, ChatGPT and its applicability to their studies

Dal Sasso *et al.* (2024) define AI as a multidisciplinary approach that combines computer science and linguistics to simulate human behavior and cognitive processes in computers. As a rapidly expanding technology, AI is increasingly present across various sectors, directly impacting fields such as education and healthcare. However, this study found that, although all medical students at FURB are familiar with the term "AI" and



recognize the applicability of ChatGPT, they are not yet fully acquainted with the tool. As a result, the integration of this technology into academic routines has been slow, with limited usage among students and an almost complete absence among faculty members.

Although 76.6% of the study participants use and recognize ChatGPT as a study support tool, its daily or weekly usage remains low. This is a noteworthy observation, considering that most respondents (83.1%) are between 18 and 25 years old and belong to Generation Z, commonly referred to as digital natives (Passero; Engster; Dazzi, 2016). The data suggest that ChatGPT's educational potential is not being fully leveraged, with significant reluctance to use the tool despite students acknowledging its usefulness.

The findings of this study differ from those reported by the Global Student Survey (Chegg.Org, 2023), which assessed the perceptions of university students from 15 different countries regarding the era of artificial intelligence. That study found that approximately 40% of students use some form of generative AI platform, such as ChatGPT, with half of these users engaging with it on a daily basis. The results of the Global Student Survey (Chegg.Org, 2023) are consistent with the projection made by Vicari (2018), who anticipated a potential evolution of AI in education by 2030, marked by increasingly adaptive systems tailored to the individual needs of each student.

Several institutions are already advancing toward this anticipated evolution, ahead of the 2030 horizon. In the United States, the Food and Drug Administration (FDA) released a regulatory guideline (2019) and an action plan (2021) for the application of AI in the medical field. Similarly, the European Union (EU) has proposed the AI Act, a landmark legal framework that governs the use of artificial intelligence across various sectors (Wong; Ming; Raja Ali, 2023).

In 2021, the World Health Organization (WHO) published its first global report on the use of AI in healthcare. The document outlines several areas of application for generative AI in the field: more accurate diagnosis and clinical care, symptom analysis and patient-centered treatment, optimization of administrative tasks and electronic health records, medical education, and scientific research. The report also recommends changes to medical education programs, shifting away from rote memorization toward the development of communication skills, emotional intelligence, ethical decision-making, and computer literacy (WHO, 2021).

To achieve this, it is necessary to integrate intelligent systems into training programs and update undergraduate curricula in response to the ongoing advancement of technology (WHO, 2021). One example is the incorporation of AI in leading educational institutions such as Harvard, which employs the technology in computer science courses. Demonstrating its transformative potential in education, such initiatives underscore AI's capacity to enhance both teaching and learning (Hosseini *et al.*, 2023). Therefore, if Brazil does not move forward and adapt its stance in light of this scenario, improving the country's educational development will become increasingly challenging.

Regarding the use of ChatGPT, an AI of growing prominence, this study indicates that medical students use the tool to understand complex concepts and solve problems. In line with the views of Breeding *et al.* (2023) and Lamattina (2023), ChatGPT facilitates



active and personalized learning through intelligent support and real-time feedback, improving students' time management and study efficiency.

Nevertheless, traditional methods are often constrained by rigid curricula and a lack of interactivity, with a predominance of lecture-based classes and the transmission of pre-packaged content. These conventional approaches, centered on the unidirectional dissemination of knowledge, may contribute to student passivity, limiting active participation in the learning process (Souza; Iglesias; Pazin-Filho, 2014). Similarly, when ChatGPT is used in a merely contemplative manner, there is a risk that students will replicate the behavioral patterns of traditional approaches, marked by a passive stance. As a result, critical analysis, reflection, and clinical reasoning skills may be neglected, rather than fostering autonomy and independent thinking.

### **Students' perceptions of AI, ChatGPT and its applicability in teaching**

Although students' resistance to active learning methodologies is widely recognized (Bressan *et al.*, 2021), the findings of this study show that the disciplines most suitable for the use of ChatGPT are those that employ such methodologies to integrate theoretical knowledge with clinical practice. In this context, medical students believe that the frequent use of ChatGPT by instructors could assist in clarifying doubts, solving clinical cases, and stimulating clinical reasoning.

Considering the role of professors in guiding their students toward the critical and constructive use of AI, it is believed that the risks of dependency could be mitigated, thereby maximizing educational benefits, reducing student passivity, and preventing plagiarism. According to a study published in the *International Journal of Educational Technology in Higher Education*, the inappropriate use of ChatGPT is associated with higher levels of procrastination, memory loss, and a negative impact on academic performance (Abbas; Jam; Khan, 2024).

The greatest challenge lies in incorporating innovative technologies to meet educational demands while ensuring adoption by both students and faculty. Consistent with the findings of Souza, Iglesias & Pazin-Filho (2014), this discussion highlights the relevance of Education 4.0, which advocates for the integration of technology with pedagogical practices that foster interaction and active student engagement (Lamattina, 2023). This approach represents meaningful progress in the quality of training for future healthcare professionals, who often face a substantial volume of complex study materials throughout their academic journey.

Since medical school faculty members, who are also practicing physicians, tend to prioritize the enhancement of their technical skills over pedagogical development, their limited engagement with AI may be attributed to a lack of familiarity with integrating technology into education. In this regard, Costa (2010) underscores the need for medical educators to strengthen their pedagogical training to effectively bridge theory and clinical practice.

Other concerns, such as the potential replacement of the teacher's role and the lack of institutional support, also hinder the use of technology. Teacher training is essential to ensure that digital technologies are effectively integrated, preparing both educators and



students for an increasingly digital world (Oliveira *et al.*, 2023). In the case of ChatGPT, it should be used as a complementary teaching tool rather than as a substitute for the educator, whose role is to guide students in the research and critical analysis of information (Loiola *et al.*, 2024). The lack of interaction with the platform reflects a neglect of efforts to transform teaching and learning into a more efficient and engaging process for all parties involved.

### **Limitations and ethical challenges of using ChatGPT in medical education**

To ensure that ChatGPT is effective in the educational context, it is essential that users know how to formulate prompts in a precise and structured manner (Dal Sasso *et al.*, 2024). In addition to guiding the system toward the desired type of information, these prompts also directly influence the quality and usefulness of the responses generated. Therefore, the ability to craft effective prompts goes beyond mere technical interaction with the tool – it also involves a clear understanding of educational objectives and how AI can enhance the learning process.

From this perspective, the research participants reported a lack of trust in the data provided by ChatGPT. Both Sallam (2023) and Lo (2023) highlight certain limitations of the platform, including the risk of academic fraud, privacy concerns, and the retrieval of incorrect or fabricated information. Despite the tool's potential, these ethical challenges cannot be overlooked, as they encompass issues such as copyright, transparency, legal implications, potential bias, plagiarism, lack of originality, inaccurate content, and limited knowledge (Sallam, 2023).

### **Concluding remarks**

This study offers relevant contributions to medical education, particularly regarding the use of Artificial Intelligence tools such as ChatGPT. The findings indicate that, despite the familiarity and acceptance of AI among medical students, the practical implementation of ChatGPT still faces challenges – both in terms of faculty adoption and students' full trust in the tool.

The study underscores the need to adapt medical curricula to incorporate emerging technologies like ChatGPT, thereby preparing students for an increasingly digitalized job market. Although the integration of this tool is promising, it requires enhanced training for both faculty and students to fully optimize its potential within the teaching and learning process.

The contributions of this study highlight the potential of ChatGPT as a complementary resource in the teaching and study of Medicine. The tool can be employed to clarify doubts, simulate patient interactions, and enrich learning through practical examples, thereby providing a more dynamic and interactive educational experience. Furthermore, the collected data indicate that, when used appropriately, AI can enhance students' understanding of concepts and improve academic performance.



However, this study presents certain limitations that must be acknowledged. Firstly, the methodology adopted was quantitative in nature, relying on structured questionnaires, which may not fully capture the complexity of students' perceptions and experiences. Secondly, the sample consisted solely of students from the Regional University of Blumenau, located in a specific region of Brazil. As such, the findings cannot be generalized to other institutions or regions within the country or globally. Additionally, the analysis was limited to students' perceptions, without incorporating an objective evaluation of ChatGPT's impact on academic performance.

To expand the discussion and validate the findings of this study, further research employing different methodological approaches is recommended. Qualitative studies, such as interviews and focus groups, are suggested to gain a deeper understanding of students' and faculty members' experiences and perceptions regarding the use of ChatGPT. In this way, comparative studies across different institutions and regions of Brazil may provide a more comprehensive view of the tool's applicability and effectiveness in medical education. Additional research could also explore the impact of ChatGPT in other areas of health education, thereby broadening the knowledge base concerning the use of AI in higher education.

The implementation of innovations in the medical field – such as those proposed in this study – has the potential to maximize the benefits of technology in education and prepare students for an increasingly digital and complex work environment. Thus, the path toward effective AI integration in education requires a commitment to pedagogical training and digital ethics. Striking a balance between these elements is essential to ensure that human skills are preserved in medical training, thereby fostering the development of empathetic professionals with clinical reasoning – qualities indispensable to comprehensive patient care.

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*Received on July 26, 2024*

*Reviewed on October 07, 2024*

*Approved on November 12, 2024*

**Editor:** Prof. Dr. Roni Cleber Dias de Menezes.

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