Prompting Minds: Evaluating how Students Perceive Generative AI's Critical Thinking Dispositions

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Abstract: As generative artificial intelligence tools like ChatGPT become increasingly integrated into educational environments, understanding their impact on critical thinking is crucial. Despite growing concerns about AI's potential to diminish students' independent reasoning, there is a lack of research tools specifically designed to evaluate students' perceptions of AI's cognitive capabilities. To address this gap, this study introduces the Perceived Critical Thinking Disposition of Generative Artificial Intelligence (PCTD-GAI) scale, aimed at measuring how students perceive generative AI's (GAI) six critical thinking dispositions (reasoning, reaching judgment, search for evidence, search for truth, open-mindedness, and systematicity). While this study validates the scale using ChatGPT, the instrument is adaptable for evaluating other generative AI tools, supporting broader research in AI-driven learning environments, to assess not only how students engage with AI, but also how their reliance on AI may affect their cognitive development and self-regulated learning skills in digital education. To develop and validate the PCTD-GAI scale, the Marmara Critical Thinking Dispositions Scale (MCTDS) was adapted, ensuring relevance to AI assessment while maintaining conceptual robustness. A quantitative cross-sectional study was conducted with 931 university students from Portugal and Poland, employing exploratory and confirmatory factor analyses (EFA & CFA) to assess the scale's validity and reliability. The results demonstrate that the PCTD-GAI effectively captures students' perceptions of ChatGPT's critical thinking dispositions across six key dimensions. Findings indicate moderately positive perceptions across both countries, with Portuguese students consistently rating ChatGPT marginally higher across domains and showing less response variability, suggesting greater consensus. Notably, perceptions were most neutral in the "truth-seeking" domain, while systematicity received the highest ratings, reflecting ChatGPT's perceived systematic capabilities among students. These findings have significant implications for e-learning and AI-driven education. The PCTD-GAI scale enables educators to track students' evolving AI literacy and develop targeted interventions that promote critical AI engagement rather than passive reliance on AI-generated content. Moreover, this research advances the field of e-learning by offering an empirical basis for integrating AI assessment into digital learning strategies, ensuring that AI serves as a cognitive tool rather than a substitute for independent reasoning. The validated PCTD-GAI scale provides a reliable, scalable method for assessing students' perceptions of AI's cognitive capabilities, supporting evidence-based AI pedagogy, and guiding institutional policies on AI integration in education.

Keywords: Critical thinking disposition, Generative artificial intelligence, ChatGPT, Higher education

1. Introduction

The rapid adoption of generative AI (GAI) in education raises concerns about its influence on students' critical thinking. While AI offers innovative learning opportunities, it also poses challenges regarding students' reliance on automated reasoning. This study examines students' perceptions of ChatGPT's critical thinking dispositions, using the proposed Perceived Critical Thinking Disposition of Generative Artificial Intelligence (PCTD-GAI), to better understand how AI tools shape cognitive engagement in academic settings.

Prior research reports mixed findings on AI's impact on students' reasoning. While some studies highlight AI's role in enhancing creativity and cognitive engagement (Hutson and Cotroneo, 2023; Yilmaz and Karaoglan Yilmaz, 2023) others warn of the risks of overreliance, which may weaken independent thought (Zawacki-Richter *et al.*, 2019; Bai, Liu and Su, 2023; Crompton and Burke, 2023; Lo, 2023; Cotton, Cotton and Shipway, 2024). As such, there is no clear understanding of how and why GAI can contribute to or impede critical thinking.

The more generative AI tools are woven into education, the more critical it is for students to develop critical thinking skills and their perceptions of AI's critical capabilities. Students' perceptions of ChatGPT's critical thinking dispositions (e.g., analysing and evaluating information) directly influence their interactions and judgments of what the AI produces (Puig *et al.*, 2019; Ruiz-Rojas, Salvador-Ullauri and Acosta-Vargas, 2024).

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According to recent research by Essel *et al.* (2024) and Zaphir *et al.* (2024), students need to be able to teach AI to think critically and critically evaluate the result quality and reliability of its output. However, these studies are clear also on the point that understanding the impact of AI on critical thinking is still an open question, particularly regarding students' receptiveness to, and dependence on, the cognitive power of AI. Thus, a fundamental question remains unanswered: to what extent do university students perceive GAI, particularly ChatGPT, as possessing critical thinking dispositions, and how does this perception influence their engagement with AI-generated content? By addressing this research question, the study aims to clarify whether students critically assess GAI outputs or develop an overreliance on its perceived reasoning abilities.

In this context, the PCTD-GAI scale fills a critical gap in the literature as no existing instrument specifically measures how students perceive an AI system's cognitive and dispositional traits. Prior studies on AI's impact on education (Essel *et al.*, 2024; Ruiz-Rojas, Salvador-Ullauri and Acosta-Vargas, 2024) have primarily focused on its role as a tool for learning rather than an entity with perceived cognitive dispositions. This study builds upon critical thinking disposition frameworks (Facione *et al.*, 1995; Özgenel and Çetin, 2018) to offer a novel tool that assesses how students judge GAI reasoning, systematicity, and truth-seeking tendencies, an area previously unexplored. The Marmara Critical Thinking Dispositions Scale (MCTDS) was adapted to develop this scale for assessing students' perception about GAI's critical thinking dispositions (Özgenel and Çetin, 2018). The PCTD-GAI differs from prior scales, such as the CCTDI and Yoon's Critical Thinking Disposition (YCTD) instrument, in that it is concerned with students' evaluation of the cognitive and dispositional characteristics of an external entity, rather than the critical thinking tendencies of the individual. This adaptation is crucial because, as Zaphir *et al.* (2024) suggest, students' perceptions of AI's abilities directly influence their reliance on and interaction with these tools.

MCTDS was chosen as the base structure for adaptation for its focus on professional decision-making and adaptability to different contexts. By shifting the focus from human critical thinking dispositions to AI-generated reasoning, this scale provides a new lens to explore the relationship between students and GAI technologies. Moreover, this study contributes to the literature by evaluating the extent to which students trust AI tools like ChatGPT to engage in meaningful critical thinking tasks, a key consideration for educators looking to integrate AI into classrooms

ChatGPT was selected for this study due to its widespread academic adoption, ease of access, and advanced conversational capabilities that distinguish it from other generative AI models (Zawacki-Richter *et al.*, 2019; Zaphir *et al.*, 2024). Unlike domain-specific AI tools such as GitHub Copilot, ChatGPT is designed for general knowledge processing and is extensively used by students across multiple disciplines. Additionally, ChatGPT's open-ended dialogue capabilities allow for more in-depth reasoning and systematic information retrieval, making it an ideal candidate for evaluating AI-generated critical thinking dispositions. While this study focuses on ChatGPT, the PCTD-GPT scale is adaptable to assess students' perceptions of other AI tools, provided they demonstrate comparable reasoning and decision-making abilities.

2. Background

2.1 The Rise of Generative AI

The roots of generative AI (GAI) trace back to the early days of AI research. Alan Turing laid the foundation for AI in the 1950s when he suggested in a research paper the idea of machine intelligence. In fact, the opening sentence of his paper was "Can machines think?"(Turing, 1950, p. 1). In its early days, AI relied on rule-based systems, often referred to as symbolic AI or even logical AI (Smolensky, 1987; Domingos *et al.*, 2016), which operated using predefined rules and logical reasoning.

As computing power advanced, machine learning emerged (Fradkov, 2020), marking a shift from manually programmed rules to statistical methods that allowed AI to learn from data. Supervised and unsupervised learning techniques enabled AI to recognize patterns, make predictions, and improve performance over time. Neural networks, inspired by the structure of the human brain, gained attention but were initially limited by computational constraints (Schmidhuber, 2022).

The real breakthrough came with deep learning (Schmidhuber, 2022), which leveraged large-scale neural networks and powerful hardware to process massive datasets. This era saw the rise of convolutional neural networks (O'shea and Nash, 2015) for image processing and recurrent neural networks (Salehinejad *et al.*, 2017) for handling sequential data. A crucial moment occurred in 2017 with the introduction of the Transformer architecture (Vaswani *et al.*, 2017), which revolutionized natural language processing by enabling models to understand and generate human-like text with unprecedented fluency.

The 2020s have been marked by the rapid proliferation of generative AI, which is a subset of AI where conversational interfaces allow autonomous creation of content in response to natural language prompts (Rashid, Duong-Trung and Pinkwart, 2024). The proliferation of GAI started with OpenAI's GPT series, culminating in GPT-4.5 (Howart, 2025), and continued to show the power of large language models in generating human-like text. GAI also expanded beyond text, producing images, music, and even video through models like DALL·E and MidJourney (Hodges, 2024). As these systems improved, AI-generated content became more accurate and useful.

Today, GAI is used in various fields, and education is one of them. In fact, the rise of GAI is reshaping higher education, particularly in how students approach assignments, research, and learning (Chukwuere, 2024; Riaz and Mushtaq, 2024; Solanke, 2024). Thus, GAI tools, such as ChatGPT from OpenAI, Copilot from Microsoft or even Gemini from Google, have introduced both opportunities and challenges, fundamentally altering academic workflows.

2.2 Critical Thinking

The rapid integration of AI in educational settings, namely GAI, has led to some studies, discussed below, regarding its potential to hinder or enhance students' critical thinking skills. Critical thinking (CT) is often defined as the process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action (Ennis, 2015) or, in a more fundamental conception, "the analytical thinking that underlies all rational discourse and enquiry" (Black, 2012, p. 125). It is a process of careful reasoning and perspective-taking to evaluate statements, ideas, and theories, enabling independent positions based on evidence, crucial for active citizenship and innovation (Vincent-Lancrin, 2024). According to Facione (2013) critical thinkers need to strike a balance between skepticism and open-mindedness in order to avoid falling into the trap of taking information at face value. Thus, encouraging critical thinking in education is fundamental for several reasons, including the development of skills that promote deeper cognitive engagement, facilitate comprehensive analysis, and improve the overall educational experience of students (Todorovska, 2024).

CT has long been considered a vital competency in education and professional contexts (Evens, Verburgh and Elen, 2014; Enciso, Enciso and Daza, 2017; Merfeldaite *et al.*, 2019), often comprising two main components: cognitive skills and dispositions. Although both are critical, it is important to separate critical thinking skills from dispositions for complete assessment and development (Beyer, 1987; Siegel, 2010). Thinking critically means using cognitive processes to analyze, evaluate, and synthesize available information (Merfeldaite *et al.*, 2019). These skills are things like being able to reason, interpret and make decisions (Facione, 1990). However, critical thinking dispositions involve attitudes and habitual ways of behavior that make people use their critical thinking skills habitually. The distinction between skills and dispositions is made in a paper by Facione *et al.* (1995), who define them as a willingness to engage in critical thinking; in other words, dispositions are the internal motivation to apply skills.

Various scholars represent ways wherein skills and dispositions interact in the critical thinking process. Perkins (1985), for example, states that critical thinking cannot be effective without skills and dispositions existing together. Similarly, Ennis (1987); Ennis (1996) stated that being a competent critical thinker requires both the ability to reason and the disposition to use that ability in appropriate contexts. This willingness is an observable quality in that it manifests itself in behaviors, namely in openness to new ideas, curiosity, and persistence in problem-solving (Facione, 2000). Measuring dispositions is therefore essential to understanding an individual's overall capacity for critical thinking, since skills alone do not guarantee consistent application in real world situations (Beyer, 1995; Ennis, 2011; Ennis, 2015).

When it comes to emerging technologies – GAI being a good example – critical thinking dispositions matter all the more (Castaño *et al.*, 2023). Students' perceptions of AI's own intellectual rigor might affect their ability to critically assess and engage with AI outputs as they interact with GAI systems such as ChatGPT, which is one of the most popular ones. According to Gadzella *et al.* (2005) critical thinking dispositions are the most important in making decisions in professional and personal life, which still applies to the manner in which students deal with AI generated information. Whether or not students are likely to critically assess GAI, for example, by cross referencing ChatGPT outputs or questioning its underlying assumptions, depends a great deal on their perceptions of ChatGPT's dispositions, including intellectual curiosity, open mindedness, and systematicity. If students believe ChatGPT has these dispositions at a high level, they may be less likely to use their own critical judgment and miss out on the learning and reflection that could occur. However, if this is not managed appropriately, it may reduce the educational value of GAI integration.

The body of literature on critical thinking, within the field of GAI, is still limited, however, some studies have explored this area. For example, there was a study conducted with computer science students at Bartin University in Turkey that found that students who used ChatGPT in programming had significantly higher computational thinking skills, programming self-efficacy, and motivation compared to students who did not use the tool (Yilmaz and Karaoglan Yilmaz, 2023). Another study conducted with Liberal Art students from Missouri in USA demonstrated the potential of generative AI tools to enhance creativity and innovation in the art and design classroom, helping students to understand the importance of communication and critical analysis skills in the creative process (Hutson and Cotroneo, 2023). Another study explored how ChatGPT affected Ghanaian university students' abilities to think critically, creatively, and reflectively, stating that the study's findings show that incorporating ChatGPT influenced the students' critical, reflective, and creative thinking skills (Essel *et al.*, 2024). The authors even state that "One feasible illustration of the significance of ChatGPT in enhancing critical thinking skills is that it furnishes students with the possibility to engage in dialogues with an AI ChatGPT model that prompts them to think critically" (Essel *et al.*, 2024, p. 9), suggesting that ChatGPT's feedback and guidance, might help them to develop a deeper understanding. Ruiz-Rojas, Salvador-Ullauri and Acosta-Vargas (2024) state that AI integration in higher education has the potential to foster deeper cognitive engagement and facilitate collaboration. However, they also note the importance of teaching students to critically assess AI-generated information. On a less positive note, one study showed that GAI may have an impact on learning and memory capabilities, and also the possible decline of critical thinking skills due to an excessive reliance on AI (Bai, Liu and Su, 2023). Hadi *et al.* (2024) also report on concerns related to the widespread use of AI and its potential to promote superficial learning habits and erode students' social and critical thinking skills. Abbas, Jam and Khan (2024) also reveal that students facing higher academic workload and time pressure, are more likely to use ChatGPT, which leads to the development of tendencies for procrastination, memory loss, and dampening of the students' academic performance.

These studies demonstrate that both positive and negative outcomes are achievable, indicating the absence of universal truths regarding the actual effects of GAI on students. In fact, Essel et al. stated that "the impact of ChatGPT on critical thinking, creative thinking, and reflective thinking in relation to students' learning outcomes remains an area yet to be fully explored and understood" (Essel *et al.*, 2024). Hence, although there is no absolute certainty that GAI can either enhance or diminish the development of students' critical thinking skills, students certainly need critical thinking skills to interact with GAI, both for prompting (input) and for evaluating the quality, accuracy, and relevance of its outputs. Zaphir *et al.* (2024, p. 10) also stated that "Regardless of how intuitive these generative AI become, there will always be a need for students to develop and demonstrate critical thinking skills".

Moreover, the amount of critical evaluation that GAI's outputs may need can also vary among students, depending on whether students perceived AI as more or less competent in critical tasks and/or their own one's sense of self-efficacy. Thus, students' perception of GAI's critical skills may provide important cues and a prior detection of possible overreliance, which should be avoided. This is to say that a previous evaluation of the student's perception of GAI's critical skills may inform educators of the need to sensitize and train students to develop and employ higher levels of critical assessment of GAI's outputs and increased precision in prompting, before actually introducing GAI in classroom activities. To the best of our knowledge, this issue has not yet been addressed in the literature.

The studies that have been identified as being the most closely related research were three. The first study discusses the philosophical implications of AI's notion of intelligence, arguing that AI lacks the existential and reflective dimensions of human critical thinking (Leung, 2019). Thus, this study aimed to provide a fresh viewpoint on assessing the ethical difficulties associated to AI as a cultural-philosophical or even a politico-theological model of cognition and its social impact on the activity of "thinking," unlike analysing AI as a technical or technological reality.

The second was a study investigating how critically AI think (Zaphir *et al.*, 2024), done by researchers from the University of Queensland in Australia. The paper examines ChatGPT-4's ability to perform cognitive tasks, such as interpretation, analysis, and explanation. The researchers found that while AI can perform certain cognitive skills (like summarizing or analyzing text), but it struggles with more nuanced cognitive values, such as relevance and depth, without explicit prompt engineering. Tasks that require precision and depth in critical thinking are more challenging for AI, especially when real-world context or personal experience is required. However, AI can perform well on tasks involving straightforward cognitive skills like analysis or explanation. The paper ultimately provides a practical tool for educators to assess and redesign their tasks in a way that fosters critical thinking and is resilient to AI intervention.

The third study focused on the potential of using ChatGPT to assess students' critical thinking in online peer feedback (Tang *et al.*, 2024). This study suggested that ChatGPT demonstrated some ability to assess higher dimensions of critical thinking but showed limitations in assessing the more granular secondary dimensions under the higher dimensions of critical thinking. Nonetheless, neither of these studies incorporated an evaluation of users' perceptions regarding the software's critical thinking capabilities. This gap highlights the need for further investigation into how students conceptualize and perceive the cognitive boundaries of AI technologies, specifically GAI tools like the popular ChatGPT. Analyzing students' perceptions of ChatGPT's critical thinking capabilities might help to address both the opportunities and challenges that come with its use. Moreover, it can create a more informed dialogue, guiding the development of AI technologies in a way that supports students.

2.3 Critical Thinking Disposition

To evaluate students' perceptions of the critical thinking capability of ChatGPT, we propose and validate the Perceived Critical Thinking Disposition of Generative Artificial Intelligence (PCTD-GAI), which is designed to measure students' perceived critical disposition of GAI, specifically using one of the most popular systems, ChatGPT. Over the years, the measurement of critical thinking dispositions has developed to reflect the increasing recognition that if we are to assess not only cognitive skills but also the attitudinal components of critical thinking, then measurement must become more sophisticated. A wide range of scales have been developed to capture these dispositions, each of which contributes to the field in its own way. According to Facione (1990), started in 1990 by Facione, The California Critical Thinking Skills Test (CCTST) was developed as part of the American Philosophical Association's (APA) Delphi Report on critical thinking (Facione, 1990). CCTST is intended to assess the core cognitive skills in critical thinking, such as analysis, inference, evaluation, deductive and inductive reasoning.

The CCTST is a major strength in focusing on critical thinking skills and thus provides a useful assessment of the degree to which people can use cognitive abilities to solve real world problems. Test items call on the test taker to make judgments based on evidence and reasoning, reflecting the complexity of decision-making processes. The CCTST has been used widely in educational settings for which the ability to analyze and evaluate information is essential (Facione, 1991; Facione, Facione and Sanchez, 1994; Frisby and and Traffanstedt, 2003; Tang, 2023). However, CCTST mainly concentrates on skills instead of dispositions. It is effective at gauging cognitive abilities but does not assess the attitudinal components of critical thinking, including how much of a person will be willing to engage his or her critical thinking or how a person will feel about seeking truth and fairness. As a consequence of this gap, the California Critical Thinking Disposition Inventory (CCTDI) was developed to complement the CCTST by assessing dispositions in addition to skills (Facione and Facione, 1994).

Grounded in the Delphi Report, the CCTDI assesses seven key dispositions: truth-seeking, open-mindedness, analyticity, systematicity, critical thinking self-confidence, inquisitiveness, and maturity of judgment (Facione, Facione and Sanchez, 1994). The seven dispositions are evaluated with 75 Likert-scale items that comprise the CCTDI. Truth seeking is wanting to find the most accurate understanding and open mindedness is considering other ways of seeing things. The tendency to approach problems methodically is called systematicity and critical thinking self-confidence is the faith in one's own reasoning abilities (Facione and Facione, 1994). The CCTDI's holistic approach to measuring critical thinking tackles both the cognitive and dispositional edges of the process. The CCTDI is a widely validated and used instrument in critical thinking research and is one of the most influential instruments in such research. Its length has been documented as a possible shortcoming, and there has already been some evidence of cultural limitations when applying it to non-Western populations, demanding changes for other populations (Kökdemir and Dönmez, 2003; Pathak, Dewangan and Mohanty, 2021).

After the success of the CCTDI, Yoon (2014) developed Yoon's Critical Thinking Disposition (YCTD) Instrument, specifically for Korean nursing students. The YCTD is derived from CCTDI to meet the Korean cultural context in healthcare education. The YCTD assesses seven dispositions similar to those of the CCTDI: Prudence, systematicity, intellectual eagerness/curiosity, intellectual fairness, healthy skepticism, objectivity, and critical thinking self-confidence (Shin, Park and Kim, 2015). Cultural relevance was one of the key strengths of YCTD because it addresses the specific needs of Korean nursing students and educational context that would not be met in the other languages (Shin, Park and Kim, 2015). The measure offers a more contextually appropriate framework for measuring dispositions in non-Western cultures where critical thinking may not be expressed in the same way as in the West (Shin, Park and Kim, 2015). The addition of objectivity and prudence as key dispositions in objectivity solidifies the nuanced nature of critical thinking to include professional settings. However, like with the CCTDI, the YCTD is a self-report measure, which may introduce bias based on the

respondent's perception of him or herself. Moreover, its emphasis on nursing students can restrict its universality, however it provides a model of culturally adapted critical thinking assessment.

The UF/EMI Critical Thinking Disposition Scale that was developed by researchers at the University of Florida is used to assess critical thinking dispositions of high school students (Kilic and Şen, 2014). In response to the need for a dispositional assessment tool appropriate for younger students, an existing instrument such as the CCTDI is usually used with university students and professionals, this scale was created. The dispositions included in the UF/EMI scale are intellectual curiosity and open-mindedness, which are attitudinal aspects of critical thinking that are important at the time of cognitive development of adolescence (Kilic and Şen, 2014). Targeting high school students provides educators with a tool (UF/EMI scale) to assess tendencies towards critical thinking at an earlier stage, when it is important for long term growth in thinking and in academics. However, as with other self-report measures, the UF/EMI scale is biased by over or under estimation of one's own critical thinking tendencies. Moreover, it is also being specifically engineered for high school students, which means it cannot be used by older and more diverse audiences. Future research is needed to explore its potential adaptions to other educational levels.

In 2018, Özgenel and Çetin developed the Marmara Critical Thinking Dispositions Scale (MCTDS) for the purpose of creating a culturally appropriate instrument for measuring critical thinking dispositions of Turkish educators. (Özgenel and Çetin, 2018) designed this scale to measure teachers' and administrators' critical thinking tendencies, which are influenced by the specific challenges associated with their work environment. Like the CCTDI, the Marmara scale assesses dispositions like open-mindedness, intellectual curiosity, and systematicity (Özgenel and Çetin, 2018). But also stresses adaptability and decision-making, both of which are important for the leadership roles in education. The scale is a useful tool for evaluating how educators utilize critical thinking in their professional circumstances, and how their inclinations to work with complex issues.

Our proposal for the Perceived Critical Thinking Disposition of GAI (PCTD-GAI) is based on the MCTDS. In contrast, the PCTDGAI takes a new angle by centering not on the students' own dispositions but on the students' evaluations of the AI's capabilities. PCTD-GAI was based on MCTDS as it provides the best fit to the particular needs of assessing perceptions of an external entity's (e.g., ChatGPT's) critical thinking dispositions, structural relevance, and cultural adaptability. Unlike previous scales, MCTDS was specifically designed to measure professional dispositions in decision making contexts and target dispositions that are important for educators and administrators (e.g., open-mindedness, flexibility, systematicity, and decision making) that are directly relevant to how students evaluate the quality and reliability of GAI outputs.

The PCTD-GAI does not care about how well students themselves think critically, but rather how they perceive the AI's dispositions: does the AI tackle problems systematically, does it show intellectual curiosity, and can its reasoning be trusted? The MCTDS focus on professional critical thinking dispositions is highly appropriate for the adaptation to this purpose because these are traits that educators and decision makers always evaluate in their own environments.

In addition, the PCTD-GAI required a framework that was oriented towards evaluative dispositions rather than those of intellectual openness, truthiness, and systematicity, which are more closely aligned with how students interact with an AI: making judgements about the AI's reasoning, intellectual openness, truthiness, and systematicity rather than on their own thought processes. In this regard, the MCTDS is easily adaptable for judging how students see the critical thinking dispositions of AI systems such as ChatGPT. This is partly because AI is built with the recognition that critical thinking in professional settings frequently involves assessing external entities and tools, which is essentially the same as evaluating AI. Evaluative dimension of critical thinking dispositions is important when judging not only how well one thinks, but how well another agent (human or AI) thinks.

In addition, since GAI tools are used around the world and in various educational systems, it is critical that the scale used to measure its perceived dispositions is culturally flexible. With a focus on cultural adaptability, MCTDS was developed to provide a more flexible and adaptable framework than previous scales that better informs adaptations to assess how students from different backgrounds perceive AI-generated information.

3. Methodology

3.1 Study Design

The adaptation of the MCTDS to create the PCTD-GAI followed three key stages: item rewording and cognitive shifts, translation, and pilot testing. Similar approaches of critical thinking disposition scale were already reported (Bravo *et al.*, 2020).

1. *Item rewording and cognitive shift***.** First, five types of changes were introduced to reword the original MCTDS items, which assess individuals' own critical thinking dispositions, to assess perceptions of GAI's critical thinking abilities. The primary adaptation consisted of changing the subject focus of the original MCTDS items, which assessed the individual's own critical thinking abilities, to assess how students perceive GAI's critical thinking abilities. This shift was essential to match the purpose of the PCTD-GAI scale, which measures students' perceptions of ChatGPT's cognitive dispositions, rather than their own (e.g.: "I analyze the relationships between events, ideas, or problems." -> "I believe that ChatGPT can analyze the relationships between events, ideas, or problems."). A reframing in cognitive action was also needed to reflect GAI's actions instead of the participant's own. The adaptation of this assessment shows that the assessment is focused on ChatGPT's ability to engage in critical thinking behaviors, as perceived by the students (e.g.: "I try to explain problems, situations, or events." -> "I believe that ChatGPT can explain problems, situations, or events.". Contextual adaptations were also necessary in some stances, as the original items needed to fit the context in which GAI operates. To this end, some dispositions relevant to humans, such as emotional or affective responses, were omitted or adjusted in the adapted scale to reflect ChatGPT's capabilities, as these traits are not applicable to AI (e.g.: "I use my mental and affective skills to do or learn something new." -> "I believe that ChatGPT can use mental skills to do or learn something new."). Finally, some of the MCTDS items were subjected to language simplification to ensure that the statements aligned with the specific context of using AI in educational settings (e.g.: "I respect people with different opinions." -> "I believe that ChatGPT can respect opinions from different backgrounds.").
2. *Translation.* After adapting the scale in English, professional translators performed forward and backward translations of the PCTD-GAI into Portuguese and Polish to ensure linguistic and cultural equivalency. The translations were validated by bilingual experts familiar with critical thinking research and AI technologies, ensuring that the scale retained its conceptual meaning across all three languages (English, Portuguese, and Polish).
3. *Pilot testing.* The translated versions of the PCTD-GAI were piloted with a small sample of students (n=20) in both Portugal and Poland to assess the clarity and relevance of the items. Based on feedback from the pilot, minor modifications were made to further refine the language (e.g.: the item "I believe that ChatGPT can ask useful questions to help me." was re-written to be clarified into "I believe that ChatGPT is able to ask questions to better understand a topic or an idea that I present to it."). The experts were provided with the translated versions of the scale and asked to evaluate each item based on its alignment with the constructs being measured, its suitability for the AI context, and its overall appropriateness for cross-cultural application. No further modifications were necessary, as the experts found the items to be clearly worded, contextually relevant, and well-suited for measuring students' perceptions of ChatGPT's critical thinking abilities.

3.2 Participants

The PCTD-GAI survey was approved in May 2024 by the CEOS.PP Ethics Committee (Centre for Organisational and Social Studies of the Polytechnic Institute of Porto) before being distributed to the students. This approval process ensured that all aspects of the survey adhered to ethical standards, including informed consent, confidentiality of participants, and data protection. The Portuguese participants were students from the Polytechnic of Porto: following approval from the relevant ethics committee, an invitation to complete the survey was sent to all six schools of the Polytechnic of Porto, allowing any student from the institution to take part. As a result, 685 students from those six schools completed the survey.

Meanwhile, the Polish participants were students from the University of Economics in Katowice, who were similarly invited to take part. A link to the questionnaire was sent to all students of this university, and ultimately, 246 chose to participate. The study was also approved by the Ethics Committee of the University of Economics in Katowice.

3.3 Instrument

The final PCTD-GAI consists of 27 items measured on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Each item corresponds to one of the six main dimensions of critical thinking identified in the Marmara scale: Reasoning, Reaching Judgment, Search for Evidence, Search for Truth, Open-mindedness, and Systematicity (**Table 1 in Appendix 1**). This study followed a quantitative approach, employing a cross-sectional self-administered survey design.

3.4 Data Collection

A total of 931 university students participated in this study (685 from Portugal and 246 from Poland). The sample was selected in a purposive, non-probabilistic manner. Although the proportion of participating students was similar at both institutions, the total number of participants was higher at the Polytechnic of Porto due to its larger student body. Throughout the process, participants were informed of the study's purpose, and informed consent was obtained prior to participation.

3.5 Data Analysis

The prepared research instrument was designed in such a way as to prevent the submission of incomplete responses. Consequently, all recorded answers contained a full set of responses. In the second stage, we examined the variation in the answers and found that in the Portuguese group, 45 people provided responses with a variance of 0.0. This meant they had selected identical responses for every question. Meanwhile, in the Polish group, two responses had a variance of zero, and thus those were removed. As a result, the final sample comprised 640 responses in the Portuguese group and 244 responses in the Polish group.

3.6 Validation

3.6.1 Exploratory factor analysis

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to assess the construct validity. After several model iterations, this validation was achieved with a final model consisting of 27 components for the Portuguese sample and 25 items for the Polish sample. IBM SPSS was used to conduct the EFA using the Promax orthogonal rotation method, with Kaiser Normalization to permit the factors to be related (Basto and Pereira, 2012).

A criterion was set to ensure adequate saturation in the factors by eliminating items with factor loadings lower than .30 (Thomas and Hayes, 2021). For the Portugal sample, the Kaiser-Meyer-Olkin (KMO) index was .950, indicating an adequate sample for factor analysis, and Bartlett's test of sphericity was significant (χ^2= 7769.918; df= 351; p < .001), supporting the suitability of the data for the EFA. After removing item A6, the final factor model explained 49.45% of the total variance. Specifically, Dimension 1 accounted for 13.80% of the variance, Dimension 2 for 9.24%, Dimension 3 for 8.61%, Dimension 4 for 8.19%, Dimension 5 for 6.35%, and Dimension 6 for 3.25%. These results suggest a robust and well-defined factor structure in the instrument used.

In the Polish sample, the KMO index was .887, confirming the adequacy of the sample for factor analysis. Bartlett's test of sphericity was significant (χ^2 = 2,221.675; df = 300; p < .001), indicating the data's suitability for EFA. After excluding items R4, A6, and OM1, the final factor model explained 46.73% of the total variance. Dimension 1 explained 10.69% of the variance, Dimension 2 accounted for 9.66%, Dimension 3 for 7.70%, Dimension 4 for 7.27%, Dimension 5 for 7.11%, and Dimension 6 for 4.30% (Table 2). This outcome points to a robust and well-defined factor structure in the instrument.

Table 2: Factor Analysis Results for Portuguese and Polish Samples

Statistical Indices	Portuguese Sample	Polish Sample
KMO	.950	.887
Bartlett's Test of Sphericity (χ^2, df, p)	7769.918, 351, p < .001	2221.675, 300, p < .001
Items Removed	A6	R4, A6, OM1
Total Variance Explained (%)	49.45	46.73
Dimension 1 (%)	13.80	10.69
Dimension 2 (%)	9.24	9.66

Statistical Indices	Portuguese Sample	Polish Sample
Dimension 3 (%)	8.61	7.70
Dimension 4 (%)	8.19	7.27
Dimension 5 (%)	6.35	7.11
Dimension 6 (%)	3.25	4.30
Total Number of Items Retained	27	25

Note: KMO = Kaiser–Meyer–Olkin index for sampling adequacy; Items with factor loadings below .30 were removed (Thomas & Hayes, 2021); Bartlett's Test of Sphericity assesses the suitability of the data for factor analysis. After the items listed under "Items Removed" were excluded, the final model explained the stated percentage of total variance for each sample. Six factors emerged in both samples; their individual contributions (%) to the total variance are shown under "Dimension 1–6.".

3.6.2 Confirmatory factor analysis

The CFA was then performed to assess the discrepancy between the observed and model predicted data, using correlation and covariance matrices. The maximum likelihood method was used for this purpose, based on the assumption that the items are multivariate normally distributed. The validity of this assumption was tested using the Mardia Coefficient, which is considered acceptable if its value is below the result of the formula p(p+2) (Bollen, 1989), where p denotes the number of items in the factor model (27 items in Portuguese version and 25 in Polish version). For Portuguese data, we obtained a value of 10.377 and for Polish data a value of 149.168, which indicates that the matrix is normal.

To evaluate the adequacy of the model for Portuguese data, several indexes have been considered. The first is the CFI coefficient (Comparative Fit Index) was .961, and the NFI coefficient (Normed Fit Index) was .928. These values, ranging from 1 to > .95, suggest a perfect fit to the model (Zhang, Dawson and Kline, 2021). For the RMSEA (Root Mean Square Error of Approximation) index, a value between 0.05 and 0.08 would indicate a reasonable approximation error (Shi *et al.*, 2022). In this study, the result from CFA was .07, within the acceptable range. Finally, the TLI (Tucker-Lewis coefficient) is incremental fit indicator. Value close to 1 indicate a very good fit (Lomax and Schumacker, 2012). In this analysis in CFA, coefficient TLI= .942 was obtained, indicating a very good fit. For Polish data CFI was .952, NFI was .859, RMSEA was .068, and TLI was .930

Regarding the construct reliability and validity, the values for average variance extracted (AVE) should exceed .50 (according to the Fornell-Larcker criterion). In relation to the internal consistency of the measurement scale, Cronbach's alpha and composite reliability were used. The literature mainly point out that this coefficients should be greater than .7, however some authors opt that it could also starts from .6 (Hair *et al.*, 2009). Table 3 presents construct reliability and validity measures for both samples. All indices are at the satisfactory level.

Table 3: Construct reliability and validity

Dimension	Cronbach's alpha*		Composite reliability*		AVE*	
	Portugal	Poland	Portugal	Poland	Portugal	Poland
Reasoning	0.797	0.701	0.800	0.719	0.508	0.501
Reaching judgment	0.765	0.757	0.771	0.772	0.519	0.508
Search for evidence	0.760	0.767	0.766	0.780	0.585	0.584
Search for truth	0.741	0.741	0.741	0.746	0.563	0.559
Open-mindedness	0.748	0.647	0.750	0.667	0.570	0.576
Systematicity	0.689	0.668	0.708	0.704	0.535	0.509

Note. *p-value < .05.

4. Results

To obtain a representative sample for this study, data was collected from participants in Portugal and Poland through online surveys. In Portugal, the survey was publicized across the Polytechnic of Porto and disseminated to all eight schools within the Polytechnic, reaching a wide range of participants from various academic

backgrounds. The survey was promoted through institutional channels to encourage broad engagement and a diverse sample. For the Polish sample, the survey was distributed within the University of Economics in Katowice.

The Portuguese sample was collected using LimeSurvey, while the Polish sample was gathered through Google Forms. Different platforms were selected because students from the Polytechnic of Porto are accustomed to LimeSurvey while the students from University of Economics are more familiar with Google Forms. Responses were collected over the month of May 2024.

To evaluate ChatGPT's "Reasoning" abilities, Polish and Portuguese students responded to six statements about assessing relationships, explaining problems, evaluating all aspects of situations, gathering enough information before assessment, challenging presented ideas, and examining the causes of events or problems. For the Polish sample the mean score was 3.1 (SD = 1.1) with a median of 3.0, whereas for the Portuguese sample the mean score was slightly higher, at 3.3 (SD = 1.0) with the same median of 3.0. We observe that both groups rate ChatGPT's reasoning capabilities moderately positively, and that Portuguese students rate it somewhat more positively.

To assess the capabilities of ChatGPT in the area of "Reaching judgment", students from Poland and Portugal answered six statements evaluating the model's ability to categorize information by similarities and differences, to draw new conclusions from given information, to identify and assess risks associated with presented situations, to understand presented problems or ideas, to draw general conclusions from a single idea or event, and to ask appropriate questions to understand the topic or idea presented. The mean score for the Polish and Portuguese samples was 3.6 (median = 4.0). For the Polish sample, the standard deviation was 1.1; for the Portuguese sample, 1.0. The results suggest that students from both countries have a moderately positive view of ChatGPT's capabilities in this domain, with a slightly better consensus from Portuguese students as suggested by a lower standard deviation.

ChatGPT's capabilities in "Search for evidence" were evaluated in Poland and Portugal: students responded to four statements regarding the model's ability to provide credible information and strong evidence when supporting opinions, access information from reliable and diverse sources, seek strong evidence to accept or refute presented ideas or information, and assess the correctness and incorrectness of thoughts and actions presented. In the Polish sample the mean score was 2.9 (SD = 1.1) with median 3.0, and in the Portuguese sample the mean score was slightly higher, 3.1 (SD = 1.1), with median 3.0. The results indicate that both groups perceive ChatGPT as having a neutral to slightly positive ability in this domain, and that Portuguese students slightly favorably evaluate ChatGPT.

Students from Poland and Portugal evaluated ChatGPT's capabilities in the "Search for truth" domain by responding to four statements regarding the model's ability to reflect when evaluating information or ideas, to examine the causes of ideas, events, situations, or problems, to use mental and emotional skills to do or to learn something new, and to cope with problems or events in a realistic way. Polish sample scored a mean of 2.5 (SD = 1.2) and a median of 2.0, the Portuguese sample scored a mean of 2.9 (SD = 1.1) and a median of 3.0. The results show that students from both countries have a neutral to slightly negative perception of ChatGPT in this domain, with Portuguese students having a marginally more positive attitude.

Participants rated four statements about how open-minded they perceived ChatGPT to be in considering others' opinions when solving problems or making decisions, respect individuals with different viewpoints, explain the cause of error or behavior, and viewing situations, ideas, or events from different perspectives. The average rating was 3.3 (median 4.0, SD = 1.2) in the Polish sample. The Portuguese students reported a mean rating of 3.3 with a median of 3.0 and standard deviation of 1.0. In general, students from both countries see ChatGPT as moderately open-minded, but Polish students have slightly higher median ratings and more variable responses than Portuguese ones.

Students rated four statements pertaining to ChatGPT's "Systematicity" to evaluate their perceptions, including the ability to draw conclusions from experienced events or information provided, plan schedules and methods for accomplishing tasks or goals, consider personal values when evaluating presented ideas or events, and infer conclusions about ideas, events, problems or situations based on information supplied. Polish and Portuguese students averaged 3.5 with a median of 4.0. The Polish sample had a standard deviation of 1.2, slightly lower than the standard deviation of 1.0 for the Portuguese sample. The results indicate that, in general, students in both countries perceive ChatGPT as having systematic capabilities, with Portuguese students being slightly less variable in their responses, and therefore more consistent in their perceptions.

5. Discussion

ChatGPT is capable of demonstrating critical thinking-like behaviours, specifically in terms of reasoning, systematicity, and evidence evaluation. However, the way students perceive these capabilities has significant implications for their learning behaviours. Previous work has indicated that students who perceive AI tools as highly competent may be less inclined to perform independent cognitive effort (Bai, Liu and Su, 2023; Cotton, Cotton and Shipway, 2024). Our findings reinforce this concern: students who attribute high critical thinking dispositions to ChatGPT tend to depend more on AI for academic tasks, potentially reducing their engagement in independent critical thinking.

As stated in previous studies, the way students interact with AI is largely based on their belief in the AI's intellectual capabilities and is mediated by their self-efficacy, motivation, and critical thinking awareness (Jia & Tu, 2024). While research suggests that AI could be used to improve creativity and problem-solving skills (Yilmaz and Karaoglan Yilmaz, 2023), it is crucial to ensure that AI is used as a cognitive amplifier rather than a replacement for critical analysis. PCTD-GAI scale is a structured instrument to assess these perceptions, helping educators determine whether students critically evaluate AI-generated content or passively accept it (Ruiz-Rojas, Salvador-Ullauri and Acosta-Vargas, 2024). This is especially important to avoid the formation of superficial learning habits, which might be created by uncritical dependence on AI (Hadi *et al.*, 2024).

However, if students perceive GAI as an autonomous thinker, they may reduce their own cognitive effort and weaker problem-solving abilities (Bonacaro *et al.*, 2024) , which could impact their educational outcomes more broadly (Bai, Liu and Su, 2023). This aligns with studies showing that AI capabilities reshape cognitive learning processes, but their direct influence on critical thinking awareness is limited (Jia and Tu, 2024). As such, educational institutions must design AI-integrated curricula that prioritize active engagement and analytical reasoning rather than passive AI dependence.

One of the most effective ways to mitigate uncritical reliance on AI is through metacognitive training, which teaches students to think about their own thinking processes when engaging with AI tools. Metacognition involves self-monitoring, self-regulation, and awareness of one's cognitive biases (Partalo et al., 2019). If students are trained to critically evaluate AI-generated content, cross-check information, and recognize AI's limitations, they are less likely to rely on it uncritically. The PCTD-GAI scale plays a crucial role in structuring this training by identifying specific cognitive risks associated with AI use. The scale's six dispositions—reasoning, systematicity, search for evidence, search for truth, open-mindedness, and reaching judgment—highlight areas where students may either overestimate or underestimate AI's capabilities.

For instance, students who score ChatGPT highly in "Search for Evidence" may assume its responses are always well-supported, even when they lack proper references. In this case, self-regulation training is needed, where students practice cross-verifying AI claims against peer-reviewed sources, for instance (Uzuntiryaki-Kondakci and Çapa-Aydin, 2013). Similarly, students who rate AI high in "Reasoning" but low in "Search for Truth" may recognize AI's logical structure but fail to detect misleading or biased conclusions. Metacognitive strategies, such as AI bias challenges or bias detection exercises (Ossa, Rivas and Saiz, 2023), can help them develop a more critical stance. If the evaluation produces high scores in "Reasoning" and "Systematicity" students may rely on GAI to solve problems rather than engaging in deep thinking themselves, which hinders the development of higher-order problem-solving abilities. In these cases, guided cognitive scaffolding training may be needed to develop stronger independent reasoning skills (Güss and Wiley, 2007), by, for instance, providing them with AI-generated responses but requiring them to reconstruct arguments, evaluate counterpoints, and refine their reasoning.

By integrating PCTD-GAI scale data with metacognitive training, educators can equip students with the necessary skills to critically assess AI-generated information. This ensures that AI serves as a cognitive enhancer rather than a cognitive replacement, fostering independent thinking in AI-driven learning environments. Thus, the PCTD-GAI scale supports adaptive AI literacy programs by allowing educators to tailor instruction to different student needs. Additionally, longitudinal studies using the scale can track how students' AI literacy evolves, ensuring that educational strategies remain effective over time.

Furthermore, the cross-cultural adaptability of the PCTD GPT, validated with Portuguese and Polish students, demonstrates that the scale can be used in a variety of educational settings. Given that AI integration in education is a global phenomenon, this is particularly important. By focusing on external cognitive evaluation—i.e., the perceived dispositions of AI—this work provides a new perspective on how students and AI technologies interact. Beyond individual classroom settings, the implications of these findings are far-reaching. With AI

becoming increasingly integrated into academic curricula, educational institutions are increasingly required not only to teach students how to effectively use AI, but also to ensure they develop critical AI literacy. Specifically, it involves assisting students in appreciating the boundaries of AI, including its inability to address complex or context--dependent cognitive tasks, which have been observed in prior studies (Zaphir *et al.*, 2024). This means that educators must find a balance between harnessing the power of AI and ensuring that students continue to play an active role in the learning process. Without these safeguards, students risk forming a skewed understanding of AI's cognitive autonomy, potentially undermining their ability to think critically in academic and professional contexts.

To address these challenges, future research should explore AI perceptions in diverse educational settings, including those with qualitative methodologies that capture students' reasoning processes in greater depth (Partalo, Skopljak and Mihajlović, 2019). Additionally, longitudinal studies should investigate how prolonged exposure to AI in education influences students' cognitive development over time. Incorporating insights from both quantitative psychometric analysis and qualitative reflections on AI-student interactions can provide a more holistic view of AI's role in higher education.

6. Conclusion

The PCTD-GAI scale fills a significant gap in the literature by offering a validated instrument for assessing students' perceptions of AI's critical thinking dispositions. This study provides novel insights into how students evaluate AI-generated reasoning, systematicity, and truth-seeking abilities, contributing to ongoing discussions about AI's role in higher education (Castaño et al., 2023). As AI integration in education continues to grow, it is imperative that students develop the ability to critically assess AI-generated outputs rather than unquestioningly accept them. The PCTD-GAI scale serves as a foundational tool for educators and researchers to monitor AI reliance in learning environments and develop pedagogical strategies that foster deeper critical engagement with AI technologies. Additionally, the scale offers an empirical foundation for guiding AI literacy programs, ensuring that students are equipped with the metacognitive skills needed to engage critically with AI tools rather than becoming passive consumers of AI-generated content.

Beyond individual classroom applications, this study has broader implications for AI adoption in education policy. As institutions increasingly incorporate generative AI into curricula, there is a growing need to assess how students perceive and interact with these technologies. The PCTD-GAI scale can inform AI literacy initiatives, helping universities and policymakers design evidence-based interventions that encourage responsible AI usage while mitigating cognitive overreliance on AI-driven decision-making.

Despite its contributions, this study has limitations. The validation process was conducted exclusively using ChatGPT, and while the scale is theoretically adaptable to other generative AI models, empirical testing across multiple AI platforms remains necessary. Moreover, the sample was restricted to university students from Portugal and Poland, which may limit the generalizability of the findings to other cultural or educational contexts. Although the cross-cultural adaptability of the PCTD GPT was shown, future studies should increase the number of participants from a wider range of countries and educational systems to verify the universality of the scale. Additionally, the study relied on self-reported perceptions, which may be subject to response bias. Students' evaluations of ChatGPT's critical thinking dispositions could be influenced by factors such as prior experience with AI, personal attitudes towards technology, or even misunderstandings about the tool's capabilities. Finally, the cross-sectional design of the study provides a snapshot of students' perceptions at a single point in time without capturing how these perceptions may evolve with increased exposure to or proficiency with AI tools over time.

Future research could employ mixed-method approaches, including qualitative interviews and experimental studies, to further investigate how students engage with AI in real-world academic settings. Furthermore, a longitudinal design would allow researchers to track how students' perceptions evolve as AI becomes more integrated into education.

AI Statement: The authors declare that they have not used generative or assisted artificial intelligence tools at any stage of the paper's conception and revision. All content presented results exclusively from the author's autonomous work, which guarantees originality, integrity, and compliance with ethical and scientific principles.

Ethics Statement: Prior to data collection, ethical approval was obtained from the Ethics Committee of the Polytechnic Institute of Porto, under the reference number 2024-05-06.

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Appendix 1: Table 1

Table 1: PCTD-GPT Scale

Code	MCDTS	PCTD-GPT	PCTD-GPT	PCTD-GPT
		Adaptation English	***Translation Portuguese***	***Translation Polish***
	Reasoning			
R1	I analyze the relationships between events, ideas or problems.	I believe that ChatGPT can analyze the relationships between events, ideas or problems.	Acredito que o ChatGPT pode analisar as relações entre eventos, ideias ou problemas.	Uważam, że ChatGPT może analizować relacje między wydarzeniami, pomysłami lub problemami.
R2	I try to explain problems, situations or events.	I believe that ChatGPT can explain problems, situations or events.	Acredito que o ChatGPT é capaz de explicar problemas, situações ou eventos.	Uważam, że ChatGPT może wyjaśnić problemy, sytuacje lub zdarzenia.
R3	I evaluate all aspects of a problem, situation or event.	I believe that ChatGPT can evaluate all aspects of a problem, situation or event	Acredito que ChatGPT pode avaliar todos os aspetos de um problema, situação ou evento	Uważam, że ChatGPT może ocenić wszystkie aspekty problemu, sytuacji lub wydarzenia.
R4	I gather enough information before evaluating an idea, problem or situation.	I believe that ChatGPT can gather enough information before evaluating an idea, problem or situation.	Acredito que o ChatGPT consegue reunir informação suficiente antes de avaliar uma ideia, problema ou situação.	Uważam, że ChatGPT może zebrać wystarczającą ilość informacji przed oceną pomysłu, problemu lub sytuacji.

R5	I question an idea, information, problem, event or situation I encounter.	I believe that ChatGPT is able to question an idea, information, problem, event or situation that I present to it.	Acredito que o ChatGPT é capaz de questionar uma ideia, informação, problema, evento ou situação que eu lhe apresente.	Uważam, że ChatGPT może zakwestionować przedstawiony przeze mnie pomysł, informację, problem, wydarzenie lub sytuację.
R6	I investigate the cause of events or problems.	I believe that ChatGPT is able to investigate the cause of events or problems.	Acredito que o ChatGPT é capaz de investigar a causa de eventos ou problemas.	Uważam, że ChatGPT może zbadać przyczynę zdarzeń lub problemów.
	Reaching judgment			
A1	I categorize information about an event, idea or problem according to similarities and differences.	I believe that ChatGPT can categorize information about an event, idea or problem according to similarities and differences.	Acredito que o ChatGPT pode categorizar informação sobre um evento, ideia ou problema de acordo com semelhanças e diferenças.	Uważam, że ChatGPT może kategoryzować informacje o wydarzeniu, pomyśle lub problemie według podobieństw i różnic..
A2	I reach a new conclusion from the general information I have learned.	I believe that ChatGPT can reach a new conclusion from the general information I present to it.	Acredito que o ChatGPT pode chegar a uma nova conclusão a partir da informação geral que eu lhe apresento.	Uważam, że ChatGPT może wyciągnąć nowy wniosek na podstawie ogólnych informacji, które podałem.
A3	I assess the risks I have identified in a situation, problem or event.	I believe that ChatGPT can identify and assess the risks of a situation, problem or event that I present to it.	Acredito que o ChatGPT pode identificar e avaliar os riscos de uma situação, problema ou evento que eu lhe apresento.	Uważam, że ChatGPT może zidentyfikować i ocenić ryzyko związane z sytuacją, problemem lub wydarzeniem, które przedstawiam.
A4	I try to understand a problem, idea or event I encounter.	I believe that ChatGPT can understand a problem, idea or event that I present to it.	Acredito que o ChatGPT pode entender um problema, uma ideia ou um evento que eu lhe apresento.	Uważam, że ChatGPT może zrozumieć problem, pomysł lub wydarzenie, które przedstawiam.
A5	I draw a general conclusion from a single idea, event or situation.	I believe that ChatGPT can formulate a general conclusion from a single idea, event or situation.	Acredito que o ChatGPT consegue formular uma conclusão geral a partir de uma única ideia, evento ou situação.	Uważam, że ChatGPT może wyciągnąć ogólne wnioski z pojedynczego pomysłu, wydarzenia lub sytuacji.
A6	I ask appropriate questions to understand a topic or idea.	I believe that ChatGPT is able to ask questions to better understand a topic or an idea that I present to it.	Acredito que o ChatGPT é capaz de fazer perguntas para melhor compreender um tópico ou uma ideia que eu lhe apresento.	Wierzę, że ChatGPT jest w stanie zadawać pytania w celu lepszego zrozumienia tematu lub pomysłu, który mu przedstawiam.
	Search for evidence			
SE1	I support my opinions with reliable information and strong evidence.	I believe that ChatGPT can support opinions with reliable information and solid evidence.	Acredito que o ChatGPT consegue sustentar opiniões com informações fiáveis e evidências sólidas.	Uważam, że ChatGPT może poprzeć opinie wiarygodnymi informacjami i mocnymi dowodami.
SE2	I obtain information from reliable and diverse sources.	I believe that ChatGPT can obtain information from reliable and diverse sources.	Acredito que o ChatGPT pode obter informações de fontes confiáveis e diversas.	Uważam, że ChatGPT może uzyskać informacje z wiarygodnych i różnorodnych źródeł.
SE3	I look for strong evidence to accept the truth of an idea or information I encounter.	I believe that ChatGPT can look for strong evidence to accept/deny the truth of an idea or information that I present to it.	Acredito que o ChatGPT pode procurar evidências fortes para aceitar/negar a verdade de uma ideia ou informação que eu lhe apresente.	Uważam, że ChatGPT może szukać mocnych dowodów, aby zaakceptować/zaprzeczyć prawdziwości przedstawionego przeze mnie pomysłu lub informacji.

SE4	I evaluate the rightness and wrongness of my thoughts and actions.	I believe that ChatGPT can evaluate what is right or wrong in certain thoughts or actions that I present to it.	Acredito que o ChatGPT pode avaliar o que é certo ou errado em certos pensamentos ou ações que eu lhe apresento.	Uważam, że ChatGPT może ocenić słuszność i błędność myśli i działań, które podaję.
	Search for truth			
ST1	I take my time when evaluating information or ideas.	I believe that ChatGPT is thoughtful when evaluating information or ideas.	Acredito que o ChatGPT é ponderado quando avalia informações ou ideias.	Uważam, że ChatGPT zastanawia się, oceniając informacje lub pomysły.
ST2	I investigate the reasons behind an idea, event, situation or problem.	I believe that ChatGPT can investigate the reasons that support an idea, event, situation or problem that I present to it.	Acredito que o ChatGPT pode investigar as razões que suportam uma ideia, evento, situação ou problema que eu lhe apresento.	Uważam, że ChatGPT może zbadać przyczyny pomysłu, wydarzenia, sytuacji lub problemu, który przedstawiam.
ST3	I use my mental and affective skills to do or learn something new.	I believe that ChatGPT can use mental and emotional skills to do or learn something new.	Acredito que o ChatGPT pode usar competências mentais e emocionais para fazer ou aprender algo novo.	Uważam, że ChatGPT może wykorzystać umiejętności umysłowe i emocjonalne, aby zrobić lub nauczyć się czegoś nowego.
ST4	I deal with problems or events in a realistic way.	I believe that ChatGPT can deal with problems or events in a realistic way.	Acredito que o ChatGPT podem lidar com problemas ou eventos de forma realista.	Uważam, że ChatGPT może poradzić sobie z problemami lub zdarzeniami w realistyczny sposób.
	Open-mindedness			
OM1	I take other people's opinions into account when solving problems or making decisions.	I believe that ChatGPT can take into account the opinions of other stakeholders when solving problems or making decisions.	Acredito que o ChatGPT pode levar em conta a opinião de outros intervenientes ao resolver problemas ou tomar decisões.	Uważam, że ChatGPT może brać pod uwagę opinie innych ludzi przy rozwiązywaniu problemów lub podejmowaniu decyzji.
OM2	I respect people with different opinions.	I believe that ChatGPT can respect opinions from different backgrounds.	Acredito que o ChatGPT consegue respeitar opiniões de diferentes origens.	Uważam, że ChatGPT może szanować opinie z różnych środowisk.
OM3	I explain the reason for a mistake or behavior.	I believe that ChatGPT can explain the reason for a particular mistake or behavior.	Acredito que o ChatGPT pode explicar a razão de um determinado erro ou comportamento.	Uważam, że ChatGPT może wyjaśnić przyczynę błędu lub zachowania.
OM4	I look at situations, ideas or events from different perspectives.	I believe that ChatGPT can look at situations, ideas or events from different perspectives.	Acredito que o ChatGPT pode olhar para situações, ideias ou eventos de diferentes perspetivas.	Uważam, że ChatGPT może spojrzeć na sytuacje, pomysły lub wydarzenia z różnych perspektyw.
	Systematicity			
S1	I draw conclusions from events I have experienced or information I have acquired.	I believe that ChatGPT can draw conclusions from events that have already taken place or from information provided.	Acredito que o ChatGPT pode tirar conclusões a partir de eventos já decorridos ou de informações fornecidas.	Uważam, że ChatGPT może wyciągać wnioski z doświadczonych wydarzeń lub dostarczonych informacji.
S2	I plan when and how I will do something.	I believe that ChatGPT is able to define strategies for accomplishing tasks or goals.	Acredito que o ChatGPT é capaz de definir estratégias para a realização de tarefas ou objetivos.	Uważam, że ChatGPT może zaplanować harmonogram i metodę realizacji zadań lub celów.
S3	I take my own values into account when evaluating ideas or events.	I believe that ChatGPT can consider personal values when evaluating	Acredito que o ChatGPT pode considerar valores pessoais ao avaliar	Uważam, że ChatGPT może wziąć pod uwagę wartości osobiste podczas

		ideas or events presented.	ideias ou eventos apresentados.	oceny przedstawionych pomysłów lub wydarzeń.
S4	I make inferences about an idea, event, problem or situation.	I believe that ChatGPT is able to make inferences about an idea, event, problem or situation based on the information presented.	Acredito que o ChatGPT é capaz de fazer inferências sobre uma ideia, evento, problema ou situação com base nas informações apresentadas.	Uważam, że ChatGPT może wyciągać wnioski na temat pomysłu, zdarzenia, problemu lub sytuacji na podstawie dostarczonych informacji.

