

Everyone Talks Everything With ChatGPT: Students' Uses of ChatGPT and Their Impact on Learning Performance

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ABSTRACT

Research suggests that ChatGPT offers numerous affordances for students, who use it for various purposes, yet the field lacks quantitative studies that offer insight into a variety of students' actual uses of ChatGPT and their impact on academic performance. The main aims of this paper were (a) to introduce and validate a typology of students' ChatGPT uses, (b) to identify clusters of students with similar patterns of ChatGPT uses, and (c) to investigate the impact of ChatGPT uses on academic performance. An online survey research was conducted, which resulted in a typology of 10 distinct uses of ChatGPT and four distinct clusters of students. The strongest predictor of academic performance is information searching and explanation. Problematic use of ChatGPT, while resulting in improved grades, is found to be detrimental to competencies. Although the study might not fully represent the diversity of students' experiences across academic institutions, the typology offers a baseline for nuanced research and interventions pertaining to particular ChatGPT uses among students.

KEYWORDS

ChatGPT, Clustering, Factor Analysis, Large Language Models, Learning Performance, Motives, Problematic Use, Regression Analysis, Students, Typology, Uses and Gratifications

ChatGPT, an application with unprecedented adoption rates (Moon, 2023; "ChatGPT Sprints," 2023), has been hailed as a groundbreaking innovation in the field of generative artificial intelligence (GAI) (AlAfnan et al., 2023; Mhlanga, 2023). Although the adoption of artificial intelligence (AI), specifically GAI, has been steadily increasing, the introduction of ChatGPT has sent a resonating wave across media, business, politics, education, and society as a whole, becoming one of the most discussed technologies over the last few years (Dwivedi et al., 2023; Sullivan et al., 2023). Especially in the field of education, ChatGPT and similar GAI tools based on large-language models (LLMs) have sparked immense amounts of research articles, preprints, conference papers, and presentations highlighting the numerous opportunities and challenges for educators and learners (Allam et al., 2023; Bahrini et al., 2023; Kocon et al., 2023; Ray, 2023; Tlili et al., 2023; Vargas-Murillo et al., 2023; Zhang & Tur, 2023). For students, who were among the early adopters integrating ChatGPT and related applications¹ into their studies ("One-Third of College Students," 2023), the tool offers numerous features for enhancing learning efficiency by explaining complex concepts, providing feedback, writing computer code, summarizing text, or adjusting texts to students' different perspectives, needs, and preferences (Baidoo-Anu et al., 2023; Meyer et al., 2023; Ray, 2023; Qureshi, 2023; Zhang & Tur, 2023). However, ChatGPT's capabilities of writing whole essays or successfully completing exams

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in different fields (Allam et al., 2023) were quickly recognized as a means of facilitating academic dishonesty and AI-assisted cheating (Bin-Nashwan et al., 2023; Cotton et al., 2024; Kocon et al., 2023; Oravec, 2023; Tlili et al., 2023). As a result, many universities have adopted rules and guidelines regarding the use of ChatGPT and GAI in general.

The question of how GAI should be incorporated and regulated in the educational field has been identified as a key priority in AI research in general (Van Dis et al., 2023). An important baseline for making meaningful and efficient decisions, rules, and guidelines is to obtain objective insight into the reality of how a certain application is used (Pfeffer & Sutton, 2006). The main research problem of this paper thus pertained to the ways in which students use ChatGPT and related applications and how these uses influence academic performance. This research should present an important baseline for further studies and the development of regulations regarding the use of ChatGPT in educational settings. Despite the abundance of research revealing the many possible affordances and perceptions of ChatGPT, it has been argued that more empirical research is needed to provide a better understanding of the patterns of the actual uses of ChatGPT and their effects on students (Allam et al., 2023; Kocon et al., 2023). Recently, studies have emerged that go beyond the identification of affordances to offer insights into students' motives for using ChatGPT and their experiences and satisfaction with it (Jishnu et al., 2023; Lee & Park, 2023; Soufan, 2023). The main findings of these studies reveal that students have very diverse perceptions of this technology and are, to some extent, aware of the issues with biases and academic integrity (Shoufan, 2023), while the main motives for use are found to be information acquisition, entertainment, academic content creation, novelty, and convenience (Jishnu et al., 2023; Lee & Park, 2023).

However, these studies have not provided direct answers to questions about what students actually do with ChatGPT, what uses emerge, and to what extent they are present in reality. For example, to what extent do students use the tool to enhance their learning, and to what extent do they engage in problematic uses, such as plagiarism? How do such different uses impact their academic success and competencies? Are there distinct groups of students who use ChatGPT only for information seeking and never for plagiarism? Establishing a typology of actual ChatGPT uses is a necessary step in answering such questions, as typologies of uses in general reduce complexities and help gain objective insights into regularities regarding the uses of a particular new information and communications technology (ICT) (Brandtzaeg, 2010; Eynon & Malmberg, 2011). Thus, the main aim of this research was threefold: (a) establish a typology of students' uses of ChatGPT and discover which uses are most and which are least present, (b) identify clusters of students with similar patterns of use, and (c) investigate the impact of different uses on academic performance.

In addition to identifying the variety of ways in which students use ChatGPT, the original value of this study lay in identifying distinct user groups and examining the role of ChatGPT in student performance, which is a crucial research question regarding GAI in general (Dwivedi et al., 2023). Numerous studies and analyses have implied that it can be an effective tool not only for enhanced learning but also for writing whole essays and cheating on assignments (Cotton et al., 2024; Kocon et al., 2023; Tlili et al., 2023). A recent report suggested that students openly embraced GAI in their studies and commonly used it unethically ("One-Third of College Students," 2023). It was thus crucial to investigate how (different) uses of ChatGPT impact students' academic performance in terms of both grades and competencies.

To answer these research questions, a theoretical background is first presented, followed by a presentation of the survey-based quantitative study, empirical verification of the measurement instrument for the proposed typology of ChatGPT uses, identification of the clusters of similar users, and investigation of the effects of various ChatGPT uses on academic performance.

THEORETICAL FRAMEWORK

Typology of ChatGPT Uses

To conceptualize a typology of ChatGPT uses, a well-known uses and gratification theoretical framework (Blumler et al., 1974; Papacharissi & Rubin, 2000; Ruggiero, 2000) was applied in this study. This framework is a logical choice whenever ICTs emerge, as it offers a general typology of ICT uses (Morris & Ogan, 1996; Severin & Tankard, 1997). Unlike other sociopsychological approaches—for example, social cognitive theory (Bandura, 2001) and the unified theory of acceptance and use of technology (Strzelecki, 2023; Venkatesh & Zhang, 2010)—that are commonly applied to investigate new technologies by focusing on the factors behind technology use and acceptance, the uses and gratification approach focuses on what people do with a certain technology (Ruggiero et al., 2000).

The use of ChatGPT has often been understood, at least in quantitative studies, as the simple frequency of using the application (Jishnu et al., 2023; Lee & Park, 2023) or the frequency of a particular use, such as the ethical use of chatbots (Mvondo et al., 2023). For comprehensive and more valid research, the conceptualization and measuring of ChatGPT uses need to be advanced in order to gain a nuanced perspective of the factors and effects of various ChatGPT uses. For example, recent research has demonstrated that higher academic integrity among researchers leads to a lower frequency of using ChatGPT in their work (Bin-Nashwan et al., 2023). This result is interesting; however, it would be even more relevant to discern what kind of usage, as not all researchers use ChatGPT in the same way and for the same purposes. Some might use it for writing emails, while others might use it for generating ideas and summarizing papers (Mvondo et al., 2023). Thus, in the context of the above findings, it would be important to know whether higher academic integrity leads to lower use of ChatGPT for any kind of purpose or only to, for example, lower use for generating ideas.

The uses and gratification approach provides an effective analytical framework for analyzing the uses of various ICTs, including blogs, social media, and mobile applications (Flanagin, 2005; Morris & Ogan, 1996; Rafaeli, 1986; Sundar & Limperos, 2013; Wei & Lo, 2006; Whiting & Williams, 2013). While this framework draws a clear distinction between motives, gratifications, and uses, which are central concepts of the theory (Ko, 2005; Sundar & Limperos, 2013; Ruggiero, 2000), the specific focus of this study was on the concept of use. Motives are “antecedent conditions,” and gratifications are “consequent conditions” (Lin, 1999), while uses involve how an ICT is actually employed in a pattern of activities (Katz et al., 1973; Palmgreen, 1984). Focusing on use offers several advantages, as motives and gratifications are often difficult to distinguish epistemologically (Ruggiero, 2001). Furthermore, a specific use may not be directly motivated by a particular motive; conversely, a use might not result in any specific gratification. Moreover, a single type of use can result in different gratifications, and this approach makes separating uses from certain factors and effects easier (Petrič et al., 2010).

The conceptualization of the uses of ChatGPT in this study draws upon the general and comprehensive typology of uses established by seminal works on the uses and gratification approach (Blumler et al., 1974) and often applied later in internet research (e.g., Papacharissi & Rubin, 2000; Ruggiero, 2000). However, to acquire detailed nuances and reach a deeper level of specificity, it is relevant to rely on recent applications of the uses and gratification approach that identify the motives for using ChatGPT in the study context and in general (Alabed et al., 2023; Lee & Park, 2023; Skjuve, 2023; Yanit et al., 2023). Among other studies, a qualitative investigation of the general population discovered that people may use ChatGPT for a wide range of other purposes beyond education and training, such as creative work, entertainment, social interaction, and support (Skjuve, 2023). In student populations, the main motivational drivers for using ChatGPT were found to be knowledge acquisition motives and hedonic motives (Lee & Park, 2023; Strzelecki, 2023). Even before ChatGPT, research discovered that the motives for using conversational AI agents went beyond functional ones and could include the search for social support, entertainment, and a positive mood (Alabed et al., 2024; Yanit et al., 2023).

To reduce complexities and avoid the idiosyncrasies of many different uses that would fall into the same category, this paper proposes a typology that leans on the general typology introduced by seminal works on the uses and gratification approach (Blumler & Katz, 1973; Katz et al., 1973) that differentiates between instrumental/informational use, social interaction, personal identity use, entertainment, and escapism. Considering the affordances and constraints of ChatGPT and the social context of its use (Kim et al., 2019), the uses of ChatGPT can be divided into the following categories:

- 1) Informational/instrumental use: This pertains to searching for information relevant to studies, brainstorming ideas for assignments, explaining concepts, improving texts technically and substantively, getting feedback, and simulating assignments.
- 2) Social interaction use: This involves acquiring formal and informal online and offline communication support, establishing and maintaining social relations, seeking social support, and understanding other people using ChatGPT.
- 3) Personal identity use: This involves using ChatGPT for assistance in online and offline self-presentation, self-reflection, or understanding oneself, and for gaining support in important future decisions.
- 4) Entertainment: This refers to the explorative use of ChatGPT for engaging in relaxing discussions, exploring the capabilities of AI, testing AI innovations, and engaging in creative nonstudy activities.
- 5) Escapism: This involves using ChatGPT for engaging in immersive discussions, exploring fictional worlds, alleviating boredom, seeking diversion from daily routines or problems, and acquiring emotional release.

Considering the prevalent discussions on the misuse of ChatGPT and academic dishonesty, we included an additional use category that encompasses various unethical and irresponsible uses (Limna et al., 2023; Mhlanga, 2023):

- 6) Problematic use: This category pertains to using ChatGPT for academic dishonesty, including activities such as plagiarism and cheating.

Based on the discussion above, the goal of this study is to test whether this theoretical typology has empirical support and to what extent students engage in these different uses of ChatGPT. Therefore, the first research question was as follows:

RQ1: To what extent is the theoretical typology represented in reality and to what extent are students' various uses of ChatGPT present?

The above-presented typology identifies ideal types of ChatGPT uses, implying two things: (a) once it has been empirically verified, the typology can be used to assess to what extent particular uses of ChatGPT are present in a certain study context, and (b) while analytically separated, in reality, different uses very likely overlap, as they are not exclusive among each other. To gain insight into what kinds of patterns of uses students engage in, if at all, it is relevant to inspect whether clusters of students exist that are similar regarding the various uses of ChatGPT. This is a relevant question for detecting whether, for instance, there are groups of students who are involved solely in problematic use or who combine it with other uses. As users of ChatGPT are not a monolithic group, it is important to reveal the multifaceted ways in which individuals interact with ChatGPT. Thus, the second research question was as follows:

RQ2: Are there any groups of ChatGPT users that have similar patterns of ChatGPT uses?

Effects of ChatGPT Uses on Learning Performance

A basic assumption of AI technologies in an educational context is that they enhance the learning process and result in better knowledge acquisition and academic performance (Luckin & Holmes, 2016). A recent systematic review (Ouyang et al., 2022) showed that AI systems in general helped improve students' academic performance by optimizing learning environments and experiences. Compared to traditional learning approaches, AI can provide students with more personalized interaction forms which, together with automatic feedback, have been found to be a good way to improve students' grades, completion rates, and learning satisfaction levels (Ouyang et al., 2022). ChatGPT is not a purposeful educational tool; however, it offers similar, if not enhanced, functionalities as those common to preceding AI technologies, such as providing immediate feedback and personalization, and it is also seen as an important supplementary tool for enhancing the educational process to make it more efficient and interesting (Qureshi, 2023). In this context, the informational/instrumental use is expected to be associated with better academic performance. At the same time, it should be noted that too much dependency on ChatGPT, especially in combination with low ChatGPT literacy (Lee & Park, 2023) in terms of being unaware of biases, inaccuracies, and other hallucinations (Meyer et al., 2023), might not bring success in terms of learning outcomes. Given academia's and the general public's questions regarding students' (problematic) use of ChatGPT, prioritizing the examination of ChatGPT's impact on knowledge and competencies is crucial. In the educational field, learning performance is a key dependent variable that refers to the process of carrying out or accomplishing a learning action, task, or function (Chang et al., 2022; Rau et al., 2008).

An even more crucial issue pertains to the currently most discussed issues with GAI in academia—that is, academic dishonesty in the form of using ChatGPT for plagiarism and cheating (Kocon et al., 2023). The main question in this context is how problematic uses of ChatGPT impact academic performance. Independent of using technologies for plagiarism, research has shown that academic dishonesty results in worse academic performance in terms of grade point average, which reflects students' knowledge acquisition, ability, effort, and persistence (Cuadrado et al., 2019). However, academic dishonesty has been found to lead to improved possibilities of success on written assignments but lower levels of satisfaction with acquired knowledge (Munoz-Garcia et al., 2014). Although no empirical evidence currently shows how “AI-garism” (Chan, 2023) influences academic performance, concerns have been raised regarding whether, in students' search for shortcuts to obtain better grades and bypass the learning process, they may achieve a good grade but cheat themselves out of an education (Chang et al., 2022). In addition, problematic uses raise the risk of relying exclusively on ChatGPT to generate content, which could result in a loss of creativity and critical thinking skills (Farrokhnia et al., 2023; Qureshi, 2023). While this practice may provide short-term opportunities to avoid poor grades, in the long term, it can be problematic and can lead to deficiencies in students' academic and professional development (AlAfnan et al., 2023). Therefore, the second aim of this paper was to investigate how different uses of ChatGPT impact learning performance. In doing so, distinguishing between student grades and the obtained competencies is crucial because, as suggested in the above discussion, problematic uses may improve grades but hinder the development of certain competencies. However, since there is not enough theoretical background on this issue, an exploratory research question that taps into this urgent question was proposed:

RQ3: What is the impact of different uses of ChatGPT on learning performance in terms of improved grades and improved competencies?

METHODS

Procedure and Participants

To analyze the research questions, a cross-sectional web survey study was conducted on a sample of students in the faculty of social sciences at the University of Ljubljana. As the largest social science faculty in Slovenia, it encompasses 12 different undergraduate and 12 master's programs and covers a variety of disciplines, including sociology, journalism, marketing, public administration, defense studies, and social informatics. All currently enrolled undergraduate and masters' students ($n = 1798$) were invited to complete a web survey through the faculty's administrative portal. Because only 35.8% opened the invitation, we decided to use an additional recruitment method: computer-assisted personal interviewing. Specifically, the students in the faculty halls were invited by interviewers to fill out the survey on tablets. In the end, 501 students viewed the informed consent page and started the survey, and 340 students completed it, resulting in an 18.9% response rate and a 67.9% completion rate. The screening question at the beginning of the survey revealed that 66.0% ($n = 318$) of the students use ChatGPT, 18.7% ($n = 90$) had tried it but did not use it, 9.9% ($n = 48$) had never tried it, and 5.4% ($n = 26$) had never heard of ChatGPT. Analyses were conducted on a subsample of students who use ChatGPT, while the sample for individual analyses varied due to missing values. More precisely, all available units for the factor-analytical procedures were used ($n = 231$), while the sample size for the regression analysis was smaller due to missing values for the demographic variables ($n = 191$). The survey, in which the respondents participated voluntarily and anonymously, was carried out in May 2023. Before conducting the survey, the faculty's Ethical Committee was consulted, and it decided that approval was not necessary for this kind of retrospective study, as it did not collect any sensitive data. All conducted research was in line with the Code of Ethics for Researchers of the University of Ljubljana (Uni-Lj, 2023).

The sample consisted of 35.5% men and 64.5% women (Table 1). The majority of the students (76.2%) were enrolled in undergraduate studies, and 23.8% were enrolled in masters' studies. Students from all 24 study programs participated in the survey. The students were found to use ChatGPT mostly on a weekly (24.7%) and monthly (24.7%) basis.

Analyses

To analyze the quality of the proposed measurement model for the uses of ChatGPT, confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) were used (using the lavaan package in R). CFA is a statistical technique for validating the proposed structure of the measurement model and assessing the fit of the hypothesized model to the observed data to provide insight into the structural validity of the measurement instrument (Hair et al., 2009). For assessing the CFA model fit, a root mean square error of approximation (RMSEA) less than .08, a standardized root mean square residual (SRMR) less than .08, and a comparative fit index (CFI) greater than .95 were considered acceptable (Browne & Cudeck, 1992). When the model fit in CFA does not fulfill the thresholds for acceptance, proceeding with EFA is suggested (Brown, 2006). This approach helps uncover the structure of factors that might diverge from the theoretically expected ones, as it identifies factors without imposing prior assumptions on the data. Factors were extracted using principal axis factoring with oblimin rotation, which is a method particularly suited for social sciences data because it accounts for common variance among items. The obtained structure was then tested again with CFA to determine the model fit of the inductively obtained structure (Brown, 2006).

To identify the natural groupings of students according to similarities in their uses of ChatGPT, a hierarchical cluster analysis was employed because it sequentially groups similar observations into clusters based on their characteristics (Kaufman & Rouseeuw, 2009). Ward's method was used, as it is particularly effective for identifying homogenous groups within the data. Based on a dendrogram, which is a graphical representation of the clustering process, a distinct set of clusters of students were identified within the data.

Table 1. Sample characteristics (n = 340)

VARIABLE	N	%
Gender		
Males	120	35.5
Females	220	64.5
Level of study		
Undergraduate	259	76.2
Masters	81	23.8
Frequency of ChatGPT use		
Daily	14	4.1
Weekly	85	25.0
Monthly	84	24.7
Less than monthly	24	7.1
Tried but do not use	78	22.9
Never tried	37	10.9
Never heard	18	5.3
Total	340	100

The Cronbach's alpha values were used to assess the reliability in terms of internal consistency, with values greater than .70 defined as acceptable (Hair et al., 2009). To analyze the impact of various uses of ChatGPT on learning performance, ordinary least squares regression was used.

Measures

Use of ChatGPT: In developing items for the six conceptual use categories, a strict, well-established methodology for developing valid and reliable scales was followed (DeVellis, 2003). First, an initial pool of items was developed based on four sources: (a) deduction from the essential definition of particular uses, (b) interviews with three students, (c) the findings of qualitative research into the uses of ChatGPT (Skjuve, 2023), and (d) identified affordances for ChatGPT use in the available published research (Limna et al., 2023; Mhlanga, 2023; Qureshi, 2023; Strzelecki, 2023). An initial set of 67 items was evaluated for content validity and clarity by three experts (one in internet studies, one in social psychology, and one in social science methodology). Following this process, a refined set of 55 items was selected. These items were then submitted to cognitive pretesting (Collins, 2003) on a small sample of students (n = 4) using a questionnaire with open-ended questions. Based on their comments, we further refined and reduced the item set and arrived at 52 items for six different uses.

In order to test the structural validity of the instrument, a CFA was conducted on the entire set of items, and the resulting fit was quite poor. Thus, an EFA was performed on the entire set of items. Due to the inadequate ratio between sample size and the number of items (Brown, 2006), two rounds of EFA were conducted separately: one on the 25 items that were supposed to measure informational/instrumental use and problematic use and the second on the remaining 27 items that were supposed to measure social interactional use, personal identity use, entertainment use, and escapism use. The first round of EFA revealed the problematic use of ChatGPT and four subdimensions of informational/instrumental use: information search, brainstorming, simulating assignments, and content and technical improvement of assignments. The EFA of the remaining items revealed the following uses: support for social interaction and self-presentation, formal communication support, exploration of ChatGPT, escapism, and fictional use. The factor solutions obtained with EFA were then tested with two rounds

Table 2. Confirmatory factor analysis of informational/instrumental and problematic uses

Scale Items	Fac1	Fac2	Fac3	Fac4	Fac5
Searching information related to course subjects	.57				
Searching information related to exams and pre-exams.	.68				
Searching information that could otherwise be obtained through other internet sources (Google, Wikipedia, etc.).	.57				
Searching information that could otherwise be obtained from scientific articles and professional literature.	.67				
Searching information that could otherwise be obtained from professors and assistants.	.65				
Acquiring assistance in understanding study literature that I might not comprehend.	.60				
Preparing for exams and pre-exams.	.68				
Producing entire homework assignments, seminar papers, essays, etc.		.64			
Achieving better grades with less effort.		.75			
Writing part of a project or seminar paper.		.81			
Obtaining advice on how to improve a text or assignment.			.52		
Verifying the accuracy of my own work and calculations (e.g., within homework assignments).			.65		
Obtaining critical evaluation of completed assignments.			.61		
Translating study literature.			.75		
Acquiring assistance in improving language style and proofreading.			.79		
Finding ideas for seminar papers and essay titles.				.76	
Generating ideas for research problems.				.82	
Gathering hints when I am unsure how to proceed with a task.				.74	
Identifying questions for an exam or pre-exam.					.79
Finding answers to potential questions for an exam or pre-exam.					.76
Cronbach's alpha	.83	.78	.78	.81	.78

Note. Fac1 corresponds to the factor "information searching and explanation"; Fac2 corresponds to "problematic use"; Fac3 corresponds to "content and technical improvement"; Fac4 corresponds to "brainstorming"; Fac5 corresponds to "simulating assignments." Only factor weights of an absolute value equal to or larger than .40 are reported. The items were measured on a three-point scale: 1-never, 2-occasionally, and 3-frequently.

of CFA. The CFA of the informational/instrumental and problematic uses demonstrated an acceptable fit of the proposed model (RMSEA = 0.063, SRMR = 0.071, $\chi^2 = 338$ [df = 178], CFI = 0.91) according to the established thresholds (Jackson et al., 2009). As the second round of CFA showed a somewhat marginal fit, three covariances were added to improve the fit, which was then acceptable (RMSEA = 0.077, SRMR = 0.079, $\chi^2 = 457$ [df = 196], CFI = 0.90). Tables 2 and 3 list all items per dimension, their factor loadings, and the Cronbach's alphas for each dimension. It should be noted that the final scale for measuring uses of ChatGPT consisted of 42 items, as the communalities of some items were too low on the existing factor solution and had to be excluded from the analysis.

Learning performance: The learning performance measure was adopted from Blasco-Arcas et al. (2013) and was measured as a perception of the impact of ChatGPT on learning performance (Chang et al., 2022). In line with theoretical reasoning, the perceived effects of using ChatGPT on study grades were separated from perceived competencies. CFA was conducted (Table 5) on both

Table 3. Confirmatory factor analysis of remaining uses

Scale Items	Fac1	Fac2	Fac3	Fac4	Fac5
Getting advice on communication and collaboration with other students.	.77				
Getting advice on resolving conflicts within the study process.	.87				
Getting advice on establishing social connections with other people.	.70				
Getting advice on maintaining relationships with friends and family.	.73				
Getting insight into how other people perceive a certain question or topic.	.69				
Getting advice on a personal or intimate matter.	.68				
Getting advice on how to present oneself to the faculty, from dressing appropriately to proper communication.	.82				
Getting advice on gaining attention online.	.73				
Exploring personal values and beliefs.	.64				
Testing the novelties offered by artificial intelligence systems.		.73			
Verifying what artificial intelligence is capable of.		.92			
Understanding how artificial intelligence works.		.78			
Acquiring assistance in writing emails to professors, assistants, and administration.			.74		
Acquiring assistance in writing social media posts.			.66		
Getting advice on improving my performance on social media.			.80		
Acquiring assistance in crafting a resume, writing job applications, and applying for opportunities.			.49		
Engaging in conversation with ChatGPT when I have no one else to talk to.				.72	
Having entertaining conversations with ChatGPT.				.83	
Overcoming boredom.				.74	
Engaging in conversations in which I forget that ChatGPT is on the other side and not a human.				.55	
Exploring fictional worlds and hypothetical scenarios.					.87
Creating stories and poems.					.62
Cronbach's alpha	.91	.85	.73	.81	.71

Note. Fac1 corresponds to the factor "supporting social interaction and self-presentation"; Fac2 corresponds to "exploration of AI"; Fac3 corresponds to "supporting formal/public communication"; Fac4 corresponds to "escapism"; Fac5 corresponds to "fictional use." Only factor weights of an absolute value equal to or larger than .40 are reported.

dimensions and demonstrated a very good fit (RMSEA = 0.001, SRMR = 0.017, CFI = 1.000, $\chi^2 = 3.34[4]$).

RESULTS

Variety of Uses for ChatGPT

To answer RQ1 regarding the presence of various uses of ChatGPT by students, arithmetic means were computed for the composed indexes pertaining to different uses, as identified by the factor-analytical procedures (see the third column in Table 6). For interpretation purposes, the percentage of students who were involved in the identified uses at least occasionally was also computed (see the

Table 4. Correlations between various uses (n = 231)

	1	2	3	4	5	6	7	8	9	10
Information searching and explanation (1)	1,00									
Problematic use (2)	.46**	1.00								
Brainstorming (3)	.44**	.27**	1.00							
Simulating assignments (4)	.44**	.51**	.20**	1.00						
Content and technical improvement (5)	.52**	.35**	.40**	.42**	1.00					
Supporting social interaction (6)	.24**	.35**	.11	.47**	.36**	1.00				
Exploration of AI (7)	.21**	.07	.16*	.13*	.27**	.26**	1.00			
Support for formal communication (8)	.25**	.18**	.17**	.35**	.41**	.59**	.29**	1.00		
Escapism (9)	.21**	.27**	.01	.25**	.25**	.49**	.58**	.32**	1.00	
Fictional use (10)	.13*	.21**	.08	.24**	.13*	.38**	.42**	.29**	.56**	1.00

* .01 < P < .05
 ** P < .01

Table 5. Confirmatory factor analysis of perceived learning performance

Scale Items	Grades	Competencies
Getting better grades on assignments because of using ChatGPT.	.87	
Getting better grades on exams and pre-exams because of using ChatGPT.	.93	
Improving academic achievement because of using ChatGPT.	.99	
Improving the competencies for the labor market because of using ChatGPT.		0.73
Improving my understanding of the course materials.		0.61
Cronbach's alpha	0.90	0.70

second column in Table 6). The analysis shows that most students use ChatGPT at least occasionally for searching for information and explanations of study materials (95.5%), for brainstorming (93.1%), and for improving study assignments in a technical and substantive sense (84.9%). The least common uses are fictional use (30.8%), supporting social interaction (39.3%), and simulating assignments (43.4%). A little more than half of all the students who used ChatGPT put it to problematic uses (52.1%). However, the most frequent uses are brainstorming (M = 2.16, SD = 0.64), searching for information and explanations (M = 1.85, SD = 0.52), and exploring AI (M = 1.68, SD = 0.62), while the least frequent use is for acquiring support in social interactions (M = 1.15, SD = 0.31).

Clusters of Similar Users

To answer RQ2, the procedure of hierarchical clustering was used to produce a dendrogram, which clearly shows a natural division, suggesting the presence of four distinct clusters of students. Each of the four identified clusters represents a unique grouping of students, characterized by specific patterns and similarities in ChatGPT uses among members of each cluster. These clusters are named *basic users* (34.6%), *academic explorers* (41.0%), *dependent users* (6.2%), and *academic opportunists* (15.1%). Figure 1 presents a series of bar charts for each of the 10 identified uses, with each bar chart representing the percentage difference of the cluster mean from the overall sample

Table 6. Presence of various uses among those who used ChatGPT (n = 231)

Use	% at least occasionally	Mean and StdDev (frequency 1–3)
Information searching and explanation	95.5%	1.85 (0.52)
Problematic use	52.1%	1.43 (0.53)
Brainstorming	93.1%	2.16 (0.64)
Simulating assignments	43.4%	1.29 (0.45)
Content and technical improvement	84.9%	1.65 (0.53)
Supporting social interaction	39.3%	1.15 (0.31)
Exploration of AI	69.2%	1.68 (0.62)
Support for formal communication	50.2%	1.31 (0.43)
Escapism	49.6%	1.33 (0.44)
Fictional use	30.8%	1.27 (0.48)

mean. Basic users can be seen as having lower-than-average use across call categories, suggesting infrequent or basic usage levels of ChatGPT. Academic explorers are engaged mostly in academic activities, such as searching for study-related information and brainstorming, suggesting a focus on using the service for generating ideas and discovering new content, while nonacademic use is relatively absent. Dependent users rely strongly on ChatGPT, as their usage is present in all categories. They use ChatGPT not only to improve skills or knowledge but also as a tool to enhance social interaction, personal development, and collaborative engagement. Academic opportunists have the highest levels of engagement in academic categories of use, but they specifically stand out in terms of problematic uses of ChatGPT for dishonest benefits.

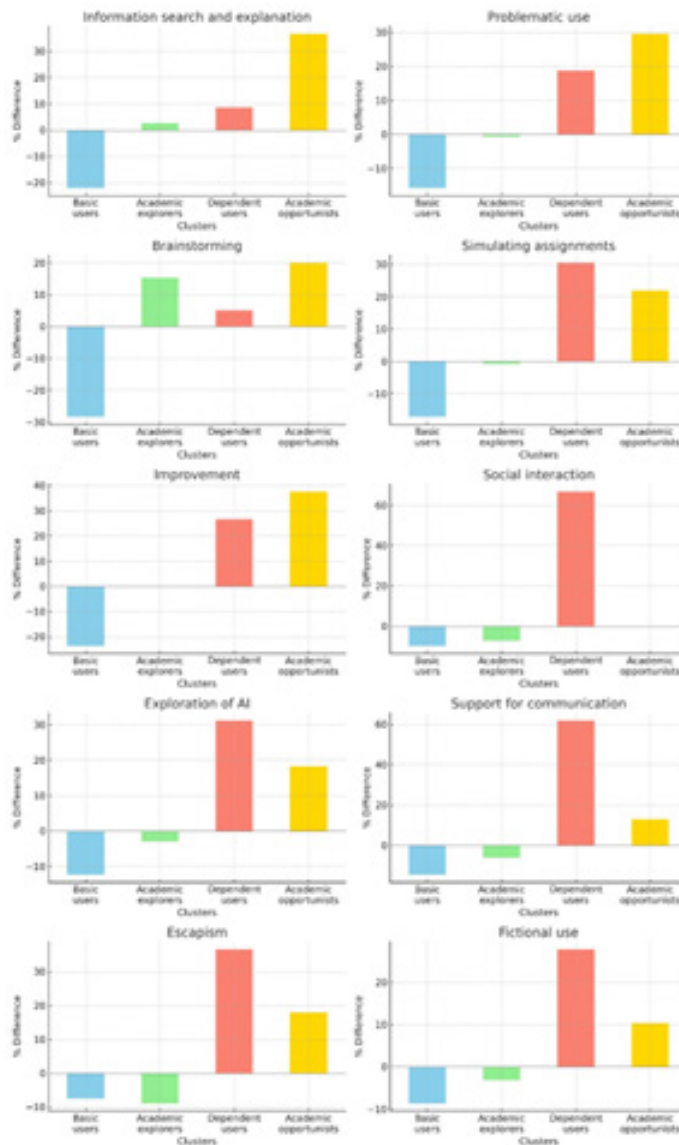
Impact of ChatGPT Uses on Learning Performance

To answer RQ3 regarding the impact of ChatGPT uses on two dimensions of perceived learning performance, two separate regression analyses were conducted: one in which the dependent variable was perceived as improved grades due to ChatGPT use and the other in which the dependent variable was perceived as improved competencies due to ChatGPT use. All identified uses were entered as predictor variables together with relevant control variables. The descriptive analysis of the dependent variables shows that the perceived impact on grades ($M = 2.59, SD = 1.03$) is lower than the perceived impact on competencies ($M = 3.75, SD = 0.79$). The first regression model demonstrates a good fit with the data ($R^2_{adj} = .378, P < .001$), as does the second regression model ($R^2_{adj} = .257, P < .001$).

For analysis of RQ3, the regression coefficients of the predictors were investigated (Table 7). Among all uses, searching for information and explanations of study materials is the strongest predictor of achieving better grades with ChatGPT ($\beta = 0.339, P < .001$). Interestingly, the problematic use of ChatGPT is also moderately associated with satisfaction with ChatGPT for getting better grades ($\beta = .234, P < .001$). No other uses have statistically significant associations with improved grades. However, among the control variables, the level of study is weakly associated with this dependent variable ($\beta = -0.117, P = .065$), with students at the undergraduate level perceiving a larger impact of ChatGPT use on getting better grades than master’s students.

The regression analysis with perceived impact on competencies as the dependent variable (Table 7) reveals a somewhat different pattern. While using ChatGPT for information searching and explanation is the strongest predictor ($\beta = 0.320, P < .001$), the effect of problematic use is the opposite ($\beta = -.210, P = .028$) of that in the first model. This suggests that problematic use leads to lower satisfaction with the competencies gained. Content and technical improvement is moderately associated with perceived competencies ($\beta = .196, P = .03$), while the exploration of AI is negatively

Figure 1. Comparison of ChatGPT uses across four distinct clusters in terms of difference from mean usage percentage



associated with perceived competencies ($\beta = -.161, P = .09$). Among the control variables, more frequent use of ChatGPT is seen to result in improved competencies ($\beta = .246, P < .001$).

DISCUSSION

Principal Findings

The main goals of this paper were to introduce a typology of students' ChatGPT uses, identify clusters of students with similar patterns of ChatGPT use, and investigate the impact of various uses of ChatGPT on academic performance. The empirical investigation of the initial theoretically deduced six-dimensional typology of ChatGPT uses reveals a more complex structure with 10 categories

Table 7. Multiple Regression with two dimensions of learning performance as dependent variables (n = 191)

Dependent variable	Better grades			Improved competencies		
	B	SE	beta	B	SE	beta
Information searching and explanation	.672	.652	.339***	.455	.146	.320***
Problematic use	.478	.167	.234***	-.292	.131	-.210**
Brainstorming	.004	.157	.003	-.030	.108	-.024
Simulating assignments	.281	.117	.119	.142	.142	.088
Content and technical improvement	.073	.175	.037	.276	.126	.196**
Supporting social interaction	.322	.149	.090	.020	.246	.008
Exploration of AI	-.138	.293	-.083	-.184	.111	-.161*
Support for formal communication	-.132	.125	-.056	.107	.154	.066
Escapism	-.152	.184	-.065	.126	.183	.076
Fictional use	.051	.205	.024	.050	.142	.034
Gender (0 = male)	-.083	.161	-.039	.027	.120	.018
Level of study (0 = undergraduate)	-.295	.138	-.117*	-.131	.141	-.071
Frequency of ChatGPT use	.093	.097	.072	.236	.086	.246***

* .05 < P < .1
 ** .05 < P < .01
 *** P < .01

that encapsulates the diverse spectrum of user interactions with the platform. In this typology, five uses pertain directly to the study process (information searching and explanation, problematic use, brainstorming, simulating assignments, and technical and content improvement), while other uses pertain to the broader context of students' academic and personal lives. Our findings, to some extent, confirm findings from previous research and suggest that motives for use, such as information acquisition, entertainment, academic content creation, and novelty (Jishnu et al., 2023; Lee & Park, 2023), indeed translate into actual uses. Our findings also suggest that the broad classification of using GAI applications for utilitarian and hedonistic goals (Yanit et al., 2023) requires a more nuanced approach. Although uses such as information searching and explanation, brainstorming, and simulating assignments correlate with each other, the factor analytical procedures show that these are distinct uses. Similarly, hedonistic uses should be separated into social uses (social interaction and communication support), on the one hand, and entertaining uses (exploration of AI, escapism, and fictional use), on the other. Although it has been suggested that hedonic uses of ChatGPT are not as popular due to the application's lack of anthropomorphic qualities (Alabed et al., 2024; Yanit et al., 2023), the findings of the current study demonstrate that students significantly engage in hedonic uses of ChatGPT.

The empirically validated typology was instrumental in discovering the presence of various uses of ChatGPT. The results suggest that the main affordances of ChatGPT in the study context as a tool that can assist in the learning process (Mhlanga, 2023; Limna et al., 2023; Qureshi, 2023) are translated, to the largest extent, into actual uses. Although previous research has shown that students are aware of critical issues in terms of biases and hallucinations (Shoufan, 2023), the vast majority of students nevertheless use ChatGPT for information seeking, explaining concepts, getting new ideas, and improving existing work. Our research did not include a measure of ChatGPT literacy (Lee & Park, 2023), which would be the next important step in contextualizing the uses in interaction with

students' critical awareness or possible lack thereof. In any case, it seems that the effectiveness and ease of the application's use outweigh its concerns, as evidenced within the confines of the studied sample.

Uses not directly related to the learning process were also seen to a lesser extent, but it is still surprising that more than one-third of the students engaged in ChatGPT uses that support social interaction, and more than half used it for support in formal communication. This is in line with a recent qualitative study on a general population of early adopters (Sjuve et al., 2023) who identified a number of nonutilitarian uses. This result is understandable considering the extended period of online interaction necessitated by the COVID-19 pandemic, which arguably resulted in certain deficiencies in social skills (Martinsone et al., 2022). While students were found to turn to ChatGPT for advice regarding interactions with other students, friends, colleagues, and even family members, the quality of such advice and the level of student satisfaction remain to be researched.

Interestingly, the exploration of AI emerged as a distinct dimension within the typology of uses, with over two-thirds of the student users experimenting with ChatGPT to understand the limitations of AI, test responses, and more. This type of use was previously indicated in recent suggestions regarding the revision of uses and gratification research (Sundar & Limperos, 2013), with certain uses serving solely to experiment with novel technology. The frequent exploration of AI is somewhat surprising, yet understandable, considering the intense media discussions and fascination with ChatGPT and LLMs in general (Sullivan et al., 2023).

The findings regarding the problematic use of ChatGPT deserve special attention. Although numerous researchers have emphasized the problematic affordances of ChatGPT for plagiarism and cheating (Chan, 2023; Kocon et al., 2023; Oravec, 2023; Zhang & Tur, 2023), it is somewhat surprising and very concerning that more than half of the students in the sample engage in problematic uses of ChatGPT, such as generating whole assignments and seminar papers with ChatGPT, thereby potentially engaging in unethical conduct. In the context of analyzing RQ2, it is found that the academic opportunists and dependent users groups in particular engage in problematic uses, while basic users and academic explorers, which represent the majority of all students, are involved in problematic uses to a lesser extent. Interestingly, the clusters of academic explorers and academic opportunists are very similar, with involvement in problematic uses being the biggest difference among them.

Furthermore, the analysis of RQ3 provides important insight into the influences of problematic uses (and other uses) on academic performance. The results support recent speculation that problematic uses may provide short-term benefits (e.g., better grades) but can lead to deficiencies and less-developed competencies in the long run (Farrokhnia et al., 2023). This confirms the concerns that students may efficiently abuse GAI without being sanctioned for it (Tili et al., 2023). However, the findings also suggest that students who cheat are aware that, in the long term, this is not beneficial for them. Previous research on academic dishonesty has demonstrated that cheating leads to lower academic performance (Couardado et al., 2023), while the current study suggests that there is a significant difference in whether academic performance is understood as grades for exams and assignments or as acquired competencies.

The analysis of RQ3 further shows that the effects of "ethical" instrumental uses of ChatGPT on academic performance are in line with existing studies on the role of AI in general in academic performance (Ouyang et al., 2022). As ChatGPT helps enhance the educational process, thus making it more efficient and interesting (Qureshi, 2023), the use of ChatGPT for information searching and explanation clearly results in better grades and competencies.

Research and Practical Implications

The emergence of a fine-grained typology with distinct categories is helpful to researchers for formulating more nuanced hypotheses regarding the factors and effects of ChatGPT usage. As the concept of "use" in current studies on ChatGPT is often reduced to a simple absence or presence of usage or the frequency of using the tool, the introduction of a typology is important for several reasons. In the evolution of the internet research field, a need to advance the conceptualization and

measuring of the concept of use can be identified (Ruggeiro, 2000). Namely, studies first understood internet use as the simple frequency or intensity of internet use but later developed into a typology of various uses (Ruggeiro et al., 2000) that allowed for the development of further sociopsychological models that focused on particular uses of the internet, such as problematic use (Song et al., 2004). In addition, an established typology of uses is also an important tool for research that aims to compare the presence of various uses among different groups of students, institutions, and national contexts.

Another research implication emerges from the finding that the use of ChatGPT extends well beyond formal educational settings. Namely, further investigations into students' use of ChatGPT and other GAI tools in everyday contexts are especially relevant, as the socialization and identity functions of education (Biesta, 2015) have received only minimal attention from educational AI researchers (Holmes & Tuomi, 2022).

In terms of practical implications, the question of whether educational institutions should integrate ChatGPT into academic activities is somewhat irrelevant, as the majority of the student population already uses the tool for a myriad of tasks. It is crucial that such integration does not happen solely in a bottom-up manner, as guidance on using the tool effectively to strengthen competencies and avoid unethical practices is necessary. We can learn from the field of AI-based educational tools and their integration into curricula to facilitate this process (Chang et al., 2022).

The concerning prevalence of problematic uses highlighted by our results underscores the urgent need to address this issue. A multilevel approach should be adopted to address the problematic uses of ChatGPT, and these efforts must not be limited to the development of AI detection software, which struggles to compete against the rapid development of emerging AI technologies (Farrokhnia et al., 2023). Establishing ethical guidelines on the acceptable use of AI tools to discourage plagiarism and academic dishonesty is surely a necessary step. Moreover, educating students about the ethical use of AI tools and raising awareness of their limitations and potential hazards, including issues of inaccuracy, privacy, and discrimination (Mhlanga et al., 2023), are crucial issues. Users should be encouraged to develop ChatGPT literacy (Lee & Park, 2023), which would equip them with the necessary skills for the responsible use of ChatGPT. Such literacy would promote use that is consistent with ethical principles and use that involves critical reflections on generated outputs, thus encouraging cross validation of the results and heightening the awareness of cultural and other biases. In this context, it is important to note that our categorization of a specific use as "problematic" does not imply that the remaining categories of use are always nonproblematic. Individual uses of ChatGPT, regardless of their categorization, may have problematic aspects, especially when outputs are uncritically taken. Finally, as ethically based programs for behavior change are rarely completely successful (Smith, 2006), it is also important to rethink the learning process and its evaluation methods, as a number of calls have been made to focus on methods that assess students' oral participation, logical thinking, flow of argumentation, and so on (Tlili et al., 2023).

The findings of this study provide a preliminary baseline for educators, institutions, and AI developers to enhance learning performance using ChatGPT. It is vital to cultivate certain ways of using these tools while cautioning against potential hazards. A relatively large cluster of academic explorers and a small cluster of academic opportunists are quite similar in their usage patterns, excluding problematic uses, and finding mechanisms to reduce the differences between these two groups is crucial. Beyond academia, our results should inform policymakers' decisions regarding the ethical use of AI in education and beyond while promoting the use of AI tools that can assist individuals in acquiring better competencies for study and work.

Since ChatGPT is also widely used in students' everyday lives, further research is needed on the effects of social interaction, self-presentation, escapism, and fictional use on individual identity, the quality of social relationships, and well-being in general. ChatGPT exhibits impressive performance on some professional exams and tests, thus demonstrating a high level of expertise. However, in terms of providing psychological advice, caution is needed, as such advice demands an understanding of an individual's social and psychological characteristics. Moreover, ChatGPT, among other AI tools,

learns from social media content, where relationships are often problematic (Blease, 2015), and such a database might result in very problematic advice for individuals and their relationships.

Limitations

This study has several limitations that hopefully lay the groundwork for further research into the uses and effects of ChatGPT and other applications based on the latest generation of LLMs. The uses and gratification approach proved to be an effective analytical framework for revealing the uses of ChatGPT. While our methodology for identifying the uses of ChatGPT followed a well-established approach within the uses and gratifications field, future research might benefit from a two-step approach (Sundar & Limperos, 2013), beginning with a qualitative exploration of uses followed by a quantitative study. Although a deductive uses and gratification approach has achieved much success within the internet research field, it is plausible that the general types of ICT uses do not account for uses that might be unique to ChatGPT, such as group collaboration (Cotton et al., 2024).

A common critique of many uses and gratification studies is that they do not analyze the uses of certain ICTs in the context of all technologies offering similar gratifications (Flanagin, 2005; Petrič et al., 2010). Although some items in this survey study implied a substitutive relation to other online resources, the extent to which ChatGPT substitutes or complements the use of other ICTs was not explored. ChatGPT is undeniably situated within a competitive multimedia environment (Flanagin & Metzger, 2001), and many commentators have advocated for its complementary use due to its limitations, suggesting that it should not be used as an exclusive source of information (Mhlanga et al., 2023). As such, a logical next step would be to focus on the issues surrounding functional alternatives (Flanagin & Metzger, 2001).

Despite the clear limitations related to the sample size and the inclusion of a single faculty, this was a large faculty offering a wide range of courses in fields such as social sciences, arts and humanities, computer science, informatics, and mathematics. However, the study might not fully represent the diversity of students' experiences and perspectives across academic institutions and cultural backgrounds and should thus be replicated at least within an entire university to ensure better external validity. There are suggestions that the efficiency of ChatGPT varies significantly across disciplines, but the evidence is inconclusive. A recent review (Lo, 2023) suggested that the quality of ChatGPT's performance is at least satisfactory in the domains of economics, programming, the English language, law, and medical education but is not satisfactory in mathematics, psychology, and software testing.

Ultimately, in the rapidly evolving field of GAI technology, the continuous emergence of new features and research papers presents a significant challenge for scientific endeavors to remain up to date and to facilitate the accumulation of relevant knowledge. This dynamic nature of GAI advancements means that, by the time research is published, there may already be newer features and findings that could not be addressed, potentially limiting the relevance of the results.

CONCLUSION

In summary, three main conclusions can be drawn from this study. First, a plethora of uses need to be considered when researching the factors or consequences of ChatGPT uses in a variety of contexts. This reinforces that ChatGPT, Gemini, and other GAI applications based on LLMs, despite their current limitations, are cutting-edge technologies with wide "interpretative flexibility." Second, students have a complex pattern of ChatGPT uses that intertwine in clusters of recognizable groups. Third, ChatGPT uses can simultaneously have positive and negative impacts on students' academic performance, depending on their involvement in the pattern of uses. A comprehensive and empirically validated typology of ChatGPT uses is thus necessary to establish a theoretical and empirical baseline for further research not only on the impacts of using this sort of tool on learning performance but also on the effects of its various uses on social inequalities, cohesion, and quality of life in general. To

conclude, educational institutions, teachers, professors, businesses, and policymakers must embrace the fact that the new reality of studying, living, and working with GAI, such as ChatGPT, is already upon us. Hopefully, the findings of this study will enable stakeholders to make more informed decisions on how to set guidelines, rules, and policies regarding the use of AI tools to empower both individuals and society simultaneously.

CONFLICTS OF INTEREST STATEMENT

There are no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data are not currently publicly available due to ongoing academic work; however, data will be available upon reasonable request.

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ENDNOTE

1 Throughout this paper, any reference to “ChatGPT” includes not only the direct use of the application via the chat.openai.com website but also its use through various plugins, addons, and other applications that rely on the ChatGPT framework. This broad definition recognizes the diverse modalities through which users might interact with the underlying AI technology.

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