The Impact of Skills Development Using ChatGPT on Employability of Public Administration Students: The Case of Slovenia

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A conversational chatbot, ChatGPT, introduced in November 2022, was one of the first artificial intelligence technologies of its kind to be made public in an easily understandable manner, and consequently, it quickly grew in popularity among higher education students. Despite some scepticism surrounding ChatGPT, there is a belief that it can be harnessed to enhance skills development, thereby improving student employability. Accordingly, the paper aims to examine the impact of skills development using ChatGPT on the employability of public administration students. The empirical analysis is based on descriptive statistics and structural equation modeling applied to a sample of 162 students enrolled in public administration study programs at the Faculty of Public Administration of the University of Ljubljana in Slovenia. The results reveal that students perceive ChatGPT as a valuable tool for skills development, especially effective for improving language and writing skills, less effective for typing and numeracy skills, and the least effective for interpersonal communication skills. The results also indicate that the perceived potential of ChatGPT to develop hard and advanced digital skills positively affects its perceived value, while its potential for developing soft and basic digital skills positively influences perceived employability. Interestingly, the perceived potential of ChatGPT to develop advanced digital skills negatively affects perceived employability, with this impact turning positive when students view ChatGPT as a valuable tool for enhancing these specific skills. The findings enrich existing knowledge with new evidence, which is crucial for educators and policymakers to consider in advancing public administration higher education in the context of new realities.

Keywords: ChatGPT, skills development, higher education, public administration, structural equation modeling, Slovenia

1 Introduction

An artificial intelligence-based chatbot, ChatGPT, was launched in November 2022 and can generate cohesive and informative human-like responses and engage in natural language conversations with users. Despite facing challenges that include copyright issues, bias, fairness, excessive reliance by students, and concerns over data privacy and security, there is a belief that ChatGPT will become an integral part of higher education. Consequently, some educational practitioners recommend engaging students with ChatGPT to enhance the learning experience rather than prohibiting its use (Aristovnik et al., 2024; Farrokhnia et al., 2023; Rudolph et al., 2023). ChatGPT offers a range of benefits that can significantly enhance the learning experience in higher education. Notably, it provides real-time feedback and guidance, assisting students in staying on track and addressing challenges as they arise. Additionally, its accessibility across various platforms, such as websites, smartphone apps, and messaging services, allows students to engage with the tool at their convenience, thereby fostering flexible learning. Furthermore, ChatGPT offers personalized support tailored to each student's choices and goals and has the potential to improve the use of open educational resources (Firat, 2023; Michalon & Camacho-Zuñiga, 2023).

With ChatGPT accessible to all students who wish to use it, many conventional tasks have quickly become outdated, given that this innovative tool can take over their completion entirely or to a significant extent (Eloundou et al., 2023). There is an extensive list of possibilities for using ChatGPT in tasks related to writing support, study assistance, language assistance, idea generation, research support, and personal assistance (Boubker, 2024). Given the extensive capabilities of ChatGPT, it is believed that it can assist students in developing a variety of skills, including hard, soft, and digital skills, which are pertinent to both public administration practice and research (Aristovnik et al., 2024; AlAfnan et al., 2023; Rahman & Watanobe, 2023; Rudolph et al., 2023). Since public administration students are seen as professionals who will shape public administration development in the future, it is important to examine their perceptions of the potential of ChatGPT.

The increasing modernization of public administration requires that future employees possess a diverse array of skills. Recent experiences have shown that future public administration specialists must be able to work in a state of high uncertainty and continual dynamic change, which also includes the ability to work effectively in a digital environment. As a result, there is a growing need to develop the skill structures of future public administration employees (Krpálek et al., 2021; Hirsch et al., 2023; Tomaževič et al., 2023). In this context, ChatGPT is seen as an opportunity to help public administration students develop necessary skills, which can, in turn, enhance learning outcomes, including employability (Aristovnik et al., 2024). To our knowledge, the existing literature on ChatGPT in higher education lacks quantitative studies that assess its potential to enhance students' skills and its implications for their perceived value and employability. Therefore, this is the first attempt to address this topic in the context of public administration students. Hence, the paper focuses on addressing the following questions:

- *RQ1: Does the perceived potential of ChatGPT to develop skills affect its perceived value?*
- *RQ2: Does the perceived potential of ChatGPT to develop skills affect its perceived potential to improve student employability?*
- *RQ3: Does the perceived value of ChatGPT affect its perceived potential to improve student employability?*

To fully understand the potential of ChatGPT in higher education, it is crucial to understand students' experiences and perceptions of it. Students' feedback can provide valuable insights into the usability of ChatGPT, highlighting areas for improvement to ensure it meets diverse learning preferences and needs. Thus, taking into account students' experiences and perceptions is essential for the successful adoption and optimization of ChatGPT as an educational tool to enhance learning outcomes, including employability. The remainder of this paper is organized as follows. The next section introduces the theoretical framework and hypothesis development. This is followed by a section describing the materials and methods. Subsequently, the empirical results are presented. The final section offers a conclusion, summarizing the main findings and their implications.

2 Literature Review and Hypotheses Development

All definitions of employability boil down to an individual's (perceived) ability to secure and sustain employment throughout their career. In this context, student employability can be defined as a set of achievements, including skills, that make students more likely to secure employment and succeed in their chosen careers (Yorke, 2004). While employability has become one of the main reasons for students to pursue higher education (Sin & Amaral, 2017), there is little clarity regarding who is responsible for student employability. The concept of graduate employability reveals an intrinsic assumption that higher education should produce students fit for the labour market (Cheng et al., 2022). Therefore, the primary focus is on preparing students to navigate the uncertainties, changes, and challenges they may encounter in their careers. As a result, the Western perspective on employability typically emphasizes competences and skills that enhance student employability (Römgens et al., 2020). Since formal education may not necessarily provide all the relevant skills for students to be successful in their careers and labour market prospects, ensuring employability typically goes beyond the scope of what formal education alone can achieve (Cheng et al., 2022). Hence, understanding the potential of ChatGPT to enhance student employability by developing an appropriate skill set is crucial.

In the context of student perceptions, value appraisals, or in other words, perceived value, are also crucial as they refer to the subjective importance that students attach to learning activities, outcomes, or domains (Pekrun et al., 2011). The concept of perceived value is, therefore, also important in the context of ChatGPT. Namely, if students believe that the support of ChatGPT is interesting, useful, and important, it can positively influence their learning outcomes, including employability (Aristovnik et al., 2024). Therefore, understanding the potential of ChatGPT to enhance its perceived value by students through developing employability skills is highly relevant. Moreover, the perceived value of ChatGPT

can play a vital role in its effectiveness as an educational tool and can be a valuable asset in a student's higher education journey, ultimately influencing their learning outcomes and employability prospects.

Hard skills are essential in public administration as they provide the technical foundation for tasks such as effective written communication, managing finances, regular reporting and efficient administrative management. These skills ensure the competent and professional delivery of public services and are often recommended to be complemented with soft skills (Krpálek et al., 2021). In this context, ChatGPT was found to be helpful with writing support by providing grammar corrections and suggestions (Lo, 2023) or even by assisting in structuring longer texts (AlAfnan et al., 2023). According to global trends, soft skills such as creativity, teamwork, and flexibility have taken centre stage in public administration. Recent research has affirmed that employees frequently utilize these skills, and there is a growing interest in enhancing them through further training (Krpálek et al., 2021). Moreover, recent findings have shown that the incorporation of ChatGPT has a discernible influence on students' soft skills, including critical, reflective, and creative thinking skills (Essel et al., 2024). Finally, modern trends in the digitalization of public administration, including the accelerated use of digital communication channels, are placing increased demands on the digital literacy of its employees (Aristovnik et al., 2021; Krpálek et al., 2021). Specifically, the rapidly increasing pace of technological change, further accelerated by emerging technologies such as artificial intelligence, is creating a growing demand for not only basic but also advanced digital skills among current and future employees. This need is particularly pertinent in public administration, which already faces significant challenges in recruiting and retaining employees with advanced digital skills (McQuiston & Manoharan, 2021).

To test the assumption that the perceived potential of ChatGPT to develop skills is a key factor in its perceived value and its impact on student employability, the following hypotheses are formulated:
- *H1: The perceived potential of ChatGPT to develop hard skills (H1a), soft skills (H1b), basic digital skills (H1c), and advanced digital skills (H1d) has a positive impact on its perceived value.*
- *H2: The perceived potential of ChatGPT to develop hard skills (H2a), soft skills (H2b), basic digital skills (H2c), and advanced digital skills (H2d) has a positive impact on its perceived potential to improve student employability.*
- *H3: The perceived value of ChatGPT has a positive impact on the perceived potential to improve student employability.*

The proposed conceptual model (Figure 1) shows the hypothesized relationships between the constructs, which are based on the theoretical framework underpinning the study.

Figure 1: Theoretical research model
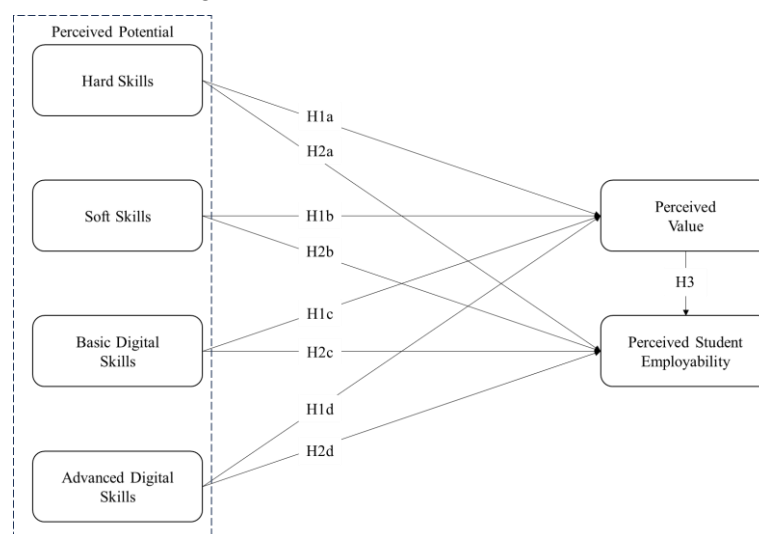
Source: Own presentation.

3 Materials and Methods

3.1 Data Collection and Participants

The data were part of the global "ChatGPT Student Survey", which focused on "Students' Perception of ChatGPT". The online questionnaire, designed in English, comprised closed-ended questions that covered various aspects relevant to the opportunities and challenges of ChatGPT for students. The survey was specifically aimed at higher education students who are at least 18 years old and possess the legal capacity to give informed, voluntary consent to participate in this voluntary and anonymous survey. However, due to its specific focus, the paper concentrates on higher education students enrolled in public administration study programmes at the Faculty of Public Administration, University of Ljubljana, Slovenia (Aristovnik et al., 2024). The data collection process was conducted from the beginning of October 2023 to the middle of January 2024 using a convenience sampling strategy. This involved promoting the survey in classrooms, as well as through advertisements on university communication systems. Due to its practical reasons, this strategy allowed for easy access to potential public administration students who were readily available and willing to participate in the survey (Boubker, 2024; Sarstedt et al., 2018).

By the middle of January, 265 participants had completed the survey. Given the focus on exploring the potential of ChatGPT in skill development and related aspects, the 26.4% of participants who reported that they had never used ChatGPT were excluded from further empirical considerations. Additionally, as completing the entire questionnaire was not mandatory, response rates varied across the questions. This situation is typically considered problematic in multivariate methods, which usually require complete data (Carter, 2006). To address missing data issues in multivariate analysis, a complete case analysis approach was applied, which operates under the assumption that data are "missing completely at random" (Little & Rubin, 2019). Consequently, after data cleaning, 162 participants who have used ChatGPT and completely responded to the questions regarding the potential of ChatGPT in skill development and related aspects remained in the sample (Table 1).

Table 1: Socio-demographic characteristics of the survey participants

Socio-demographic characteristics	Number (#)	Share (%)
Gender		
Male	42	26.3
Female	118	73.8
Student status		
Full-time	156	96.3
Part-time	6	3.7
Level of study		
Undergraduate	134	83.2
Postgraduate	27	16.8
Mode of study		
Traditional learning	75	46.3
Online learning	12	7.4
Blended learning	75	46.3
Version of ChatGPT		
ChatGPT-3.5	156	96.3
ChatGPT-3.5/4.0	6	3.7
Source of initial information about ChatGPT		
Mainstream media news	16	9.9
Social media	49	30.2
Class and/or work	41	25.3
Friends and/or family	56	34.6

Note: Due to missing values, some socio-demographic aspects do not total up to the number of the final sample.

Source: Own calculations based on ChatGPT Student Survey.

Most of the survey participants are female (73.8%) and full-time students (96.3%), predominantly enrolled in undergraduate public administration study programs (83.2%). Most of them are currently engaged in either traditional learning or blended learning as their mode of study (both at 46.3%), while a smaller proportion of students are involved in online learning (7.4%). Most of the students use ChatGPT-3.5 (free version), having primarily learned about it from friends and/or family (34.6%), with others finding out through social media (30.2%), classes and/or work (25.3) and a smaller proportion through mainstream media news (9.9%).

3.2 Measures

The paper primarily focuses on questionnaire segments that address skills development, value appraisal, and perceived employability in the context of ChatGPT. Public administration students specifically reported their perceptions of the potential to develop hard, soft, and digital skills, as well as their value appraisal and perceived employability. Accordingly, the perceived potential of ChatGPT to develop skills is assessed with 18 items, divided into three categories: 6 items for hard skills, 6 for soft skills, and 6 for digital skills, which are further subdivided into 3 items, each for basic and advanced digital skills, respectively. Moreover, both the perceived and perceived student employability are assessed with 3 items each. This is altogether 24 survey items, representing a basis for measuring the 6 latent constructs used in the proposed conceptual model. Individual survey items were measured on a 5-point Likert rating scale ranging from 1 (e.g., strongly disagree) to 5 (e.g., strongly agree). A detailed overview, including the set of survey items, is presented in Table 2.

3.3 Data Analysis

The collected data were analyzed using descriptive statistics and structural equation modeling techniques. Firstly, descriptive statistics were calculated using SPSS (Version 28) to assess student perceptions of the potential of ChatGPT in developing individual skills. Secondly, structural equation modeling was performed using AMOS (Version 28) to examine the relationships between skills development (hard skills, soft skills, basic digital skills and advanced digital skills), value appraisal, and perceived employability in the context of ChatGPT. Namely, structural equation modeling, a multivariate analysis technique commonly used in behavioural studies (Hair et al., 2010), enables the determination of complex relationships among latent constructs by simultaneously running multiple regression equations and accounting for measurement error in observed variables (Kline, 2011).

4 Results

4.1 Descriptive Statistics

According to the collected data, a significant portion of public administration students (45.1%) generally agree that ChatGPT has the potential to improve their skills. Since ChatGPT provides numerous possibilities for supporting tasks related to writing support, study assistance, language assistance, idea generation, research support, and personal assistance, the perceived potential of ChatGPT may differ across different skills that students learn while performing these tasks (Figure 2). Most students primarily agree that ChatGPT can enhance their proficiency in foreign languages, professional writing, and academic writing, all categorized as hard skills. There is less agreement, however, on its potential to improve the remaining hard skills, such as typing proficiency, natural language understanding, and numeracy. Many students also believe that ChatGPT can improve most of their basic and advanced digital skills, with the notable exception of digital content creation, where agreement is lower. Finally, students generally reported lower levels of agreement that ChatGPT can enhance their soft skills, particularly in interpersonal communication.

Figure 2: The potential of ChatGPT in developing skills
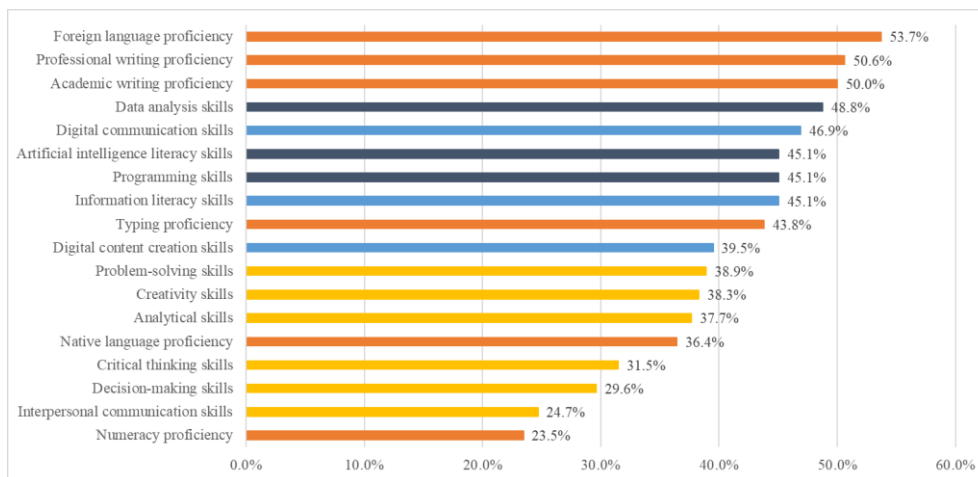
Note: Orange – hard skills, yellow – soft skills, light blue – basic digital skills, dark blue – advanced digital skills.

Source: Own calculations based on ChatGPT Student Survey.

4.2 Structural Equation Model

In order to assess the reliability and validity of the measurement model, structural equation modeling (SEM) was conducted using the maximum likelihood estimation method to examine the relationships between observed variables and latent constructs. Accordingly, several criteria were checked (Table 3). The first criterion used to evaluate the model is the scale reliability with Cronbach's alpha (Cα) and composite reliability (CR) measurements. The results show that the values of Cronbach's alpha and composite reliability are all above 0.7, indicating acceptable internal reliability of the latent constructs (Hair et al., 2019).

Table 2: Reliability and validity test

Construct	Survey Item	Std. Estimate	CR	AVE	Cα
Hard Skills	Typing proficiency	0.812	0.936	0.590	0.889
	Professional writing proficiency	0.889			
	Academic writing proficiency	0.872			
	Native language proficiency	0.601			
	Foreign language proficiency	0.729			
	Numeracy proficiency	0.663			
Soft Skills	Problem-solving skills	0.829	0.916	0.525	0.862
	Decision-making skills	0.836			
	Interpersonal communication skills	0.592			
	Analytical skills	0.784			
	Critical thinking skills	0.673			
	Creativity skills	0.586			
Basic Digital Skills	Digital content creation skills	0.719	0.900	0.629	0.842
	Information literacy skills	0.836			
	Digital communication skills	0.819			
Advanced Digital Skills	Artificial intelligence literacy skills	0.692	0.842	0.511	0.764
	Programming skills	0.671			
	Data analysis skills	0.777			
Perceived Student Employability	Facilitate my personal development.	0.784	0.883	0.589	0.809
	Facilitate my academic development.	0.782			
	Improve my employability.	0.735			
Perceived Value	ChatGPT is interesting to me	0.829	0.865	0.555	0.775
	ChatGPT is important to me	0.714			
	ChatGPT can help with things in everyday life	0.684			

Source: Own calculations based on ChatGPT Student Survey.

The second criterion used to evaluate the model is convergent validity, which represents the degree to which measurement scales are related to the corresponding construct. This is assessed by checking the average variance extracted (AVE), a common measure of convergent validity, for each construct from its indicators (Guo et al., 2020). Both the average variance extracted and the standard factor loadings (the relationship between the collective queries and the primary factors they are intended to indicate) of the questionnaire items were above 0.50 and 0.60, respectively, indicating strong convergent validity (Fornell & Larcker, 1981; Ni et al., 2023). The third criterion used to evaluate the model is discriminant validity, a measure of the degree to which items distinguish between constructs (Table 3). To test discriminant validity, the average variance extracted scores of each construct and their correlations with other constructs have been examined. All the correlations between variables are smaller than the average variance extracted scores, suggesting good discriminant validity (Hair et al., 2019; Ni et al., 2023).

Table 3: Discriminant validity

	(1)	(2)	(3)	(4)	(5)	(6)
Hard Skills (1)	**0.590**					
Soft Skills (2)	0.415	**0.525**				
Basic Digital Skills (3)	0.482	0.346	**0.629**			
Advanced Digital Skills (4)	0.437	0.461	0.457	**0.511**		
Employability (5)	0.482	0.508	0.396	0.279	**0.589**	
Perceived Value (6)	0.348	0.184	0.166	0.371	0.471	**0.555**

Note: Non-bold values are squared correlations between constructs, and bold diagonal values are the AVE scores.
Source: Own calculations based on ChatGPT Student Survey.

Additionally, commonly used fit indices were used in assessing the goodness-of-fit of a model. The results demonstrate an adequate fit of the model based on several indices, such as CMIN/DF = 2.468 (less than 3), RMSEA = 0.095 (less than 0.1), PNFI = 0.664 (more than 0.6), CFI = 0.849 (more than 0.8), TLI = 0.824 (more than 0.8). The main path coefficients and explained variances of the endogenous variables (R^2) are presented in Figure 3. The analysis of the structural model suggests that the perceived potential of ChatGPT to develop skills can explain 42.2% of the variance in the perceived value of ChatGPT and 79.2% of the variance in the perceived potential of ChatGPT to improve student employability. This indicates that the structural model possesses sufficiently strong explanatory power.

Figure 3: Results of the structural model
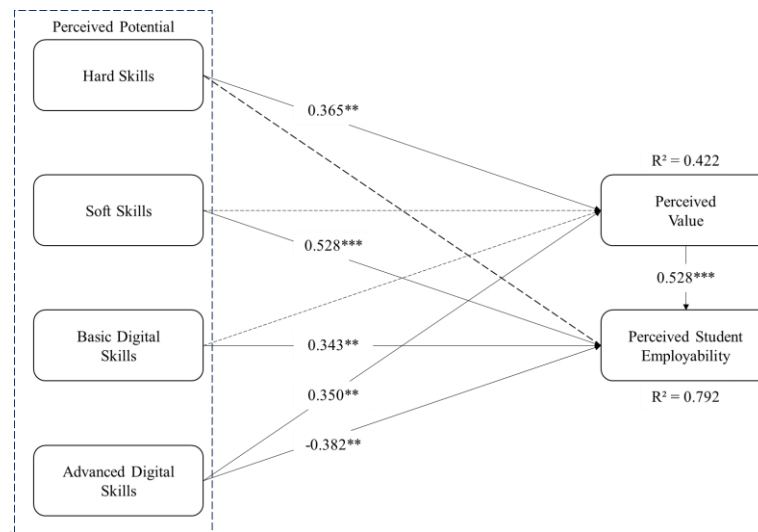
Note: Dashed lines indicate non-significant relationships (i.e., p > 0.05); solid lines indicate significant relationships; **p < .01; ***p < 0 .001.
Source: Own calculations based on ChatGPT Student Survey.

The results reveal that the perceived potential of ChatGPT to develop skills is positively related to its perceived value in the cases of hard skills ($\beta = 0.365$, $p < 0.01$) and advanced digital skills ($\beta = 0.350$, $p < 0.01$). Thus, H1a and H2d are supported at the 1% level of significance. In the cases of soft skills and basic digital skills, the relationship is not statistically significant ($p > 0.05$). Therefore, the hypotheses H1b and H1c are not supported. Moreover, the results reveal that the perceived potential of ChatGPT to develop skills is positively related to its perceived potential to improve student employability in the cases of soft skills ($\beta = 0.528$, $p < 0.001$) and basic digital skills ($\beta = 0.343$, $p < 0.01$), while it is negatively related in the case of advanced digital skills ($\beta = -0.382$, $p < 0.01$). Thus, H2b is supported at the 0.1% level of significance and H2c at the 1% level of significance, while H2d is not supported due to an unexpected significant negative effect at the 0.1% level of significance. In the case of hard skills, the relationship is not statistically significant ($p > 0.05$), and therefore the hypothesis H2a is not supported. Finally, the results reveal that the perceived value of ChatGPT is positively related to its perceived potential to improve student employability ($\beta = 0.528$, $p < 0.001$), supporting H3 at the 0.1% level of significance.

5 Discussion and Conclusion

The current paper further expands the understanding of ChatGPT's potential to develop skills and enhance student employability by exploring the perceived value of ChatGPT in the context of public administration students. The results show that most students agree that ChatGPT can improve their foreign language, professional, and academic writing skills but are less convinced about its ability to enhance other hard skills like typing, understanding natural language, and numeracy. They also see ChatGPT as beneficial for most digital skills except digital content creation, where consensus is lower. Additionally, there is generally lower agreement that ChatGPT can improve soft skills, especially in interpersonal communication.

Moreover, the results of the structural equation model reveal additional interesting insights. First, students' perception that ChatGPT enhances hard skills positively influences its perceived value among them but does not significantly impact its perceived potential to enhance their employability. This suggests that while students appreciate ChatGPT for improving their hard skills and value it as a learning tool, they do not clearly connect these skill enhancements to improved employability prospects in public administration. Second, students see ChatGPT as helpful for improving soft skills, which they believe could enhance their employability. However, this perception does not substantially increase the perceived value of ChatGPT as an educational tool for them, suggesting they might prioritize improvements in hard skills more when assessing the benefits of ChatGPT for their education. This is in line with previous findings in educational research in the context of public administration, suggesting a shifting educational paradigm in targeting the balanced development of hard and soft elements of education (Krpálek et al., 2021).

Third, the observation that students believe ChatGPT helps improve basic digital skills indicates that this perception positively affects its potential to enhance their employability. This suggests that students recognize the growing demand for digital literacy in the modern workplace and view ChatGPT as beneficial for meeting these requirements, potentially improving their employability prospects. However, this belief in the role of ChatGPT in enhancing basic digital skills does not significantly alter its overall perceived value as an educational tool among these students. This can be attributed to the fact that basic digital skills are very familiar to students, who often use them on a day-to-day basis. (Aristovnik et al., 2024). Fourth, the result that students perceive ChatGPT as a beneficial tool for enhancing advanced digital skills suggests that this perception positively influences the perceived value of ChatGPT as an educational tool among them. This indicates that students highly value the capacity of ChatGPT to help in developing higher-level competencies, thereby elevating its importance in their educational toolkit. Fourth, the result that students perceive ChatGPT as a beneficial tool for enhancing advanced digital skills suggests that this perception positively influences their perceived value of ChatGPT as an educational tool. However, interestingly, this positive perception negatively impacts their perceived potential to enhance their employability. This could imply that while students appreciate the enhancement of advanced digital skills through ChatGPT for educational or personal purposes, they

may be sceptical or uncertain about the recognition or valuation of these skills in the labour market when acquired through artificial intelligence.

These intriguing findings regarding the potential of ChatGPT to improve digital skills can be attributed to two key factors. First, public administration students may perceive a skills gap, believing that their primary skill set lacks proficiency in advanced digital areas, even if they use ChatGPT to enhance these skills. This perception of inadequacy could lead them to believe that their artificial intelligence-enhanced abilities are not competitive or unique when compared to peers from more technically oriented disciplines. Second, there is a concern among these students about overreliance on ChatGPT, particularly for skills outside their main area of study. This dependency may be viewed negatively by potential employers in public administration, who typically value a more traditional skill set, including soft skills and basic digital skills, thus influencing students' perceptions of the potential of ChatGPT to improve their employability.

Finally, the results confirm that the perceived value of ChatGPT has a positive impact on the perceived potential to improve students' employability. This suggests that when students view ChatGPT as valuable for their learning, it enhances their belief in its ability to improve their employability. In other words, if students find ChatGPT useful and beneficial in their studies and career preparation, they are more likely to believe it can positively influence their employability in the field of public administration. This highlights the importance of recognizing the value of educational tools like ChatGPT in shaping students' perceptions of their own career readiness within the realm of public administration.

One relevant limitation of the paper should be noted. The majority of aspects in the questionnaire were in the form of students' self-reports. This kind of process is usually complex and requires both recall and insight, potentially leading to recall bias and social desirability bias due to the self-reported nature of the research (Aristovnik et al., 2020). Nevertheless, the findings of the paper contribute to existing scientific knowledge about the potentials of ChatGPT and offer educators and policymakers evidence-based suggestions for the future development of public administration higher education,

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