

Assessing Students' Work Habits in the Era of ChatGPT at University Level in Pakistan: A Comprehensive Study

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Abstract- EdTech, such as the ChatGPT allows for an effective consideration of a new learning paradigm in the current educational setting. Currently, conventional pedagogy is most prevalent in Pakistan and replacing it with innovative methods such as utilizing advanced technologies such as ChatGPT might have a profound impact on the outcomes of educational processes. This paper's objective is to explore the effects of ChatGPT on university students' work behavior and performance by comparing the productivity level, learning achievement, communication skills, and work commitment of the participants before and after using the tool. Using both qualitative and quantitative cross-sectional survey, 113 participants were used in this study. The quantitative data were collected by structured self-administered survey questionnaire containing 24 close-ended questions and the results were statistically analyzed by using SPSS. The quantitative data was obtained in a structured manner whereas the qualitative data was obtained through structured interviews and observations. Main findings suggest that, overall, ChatGPT has a positive impact on work patterns among university students: effectivity and efficiency, and the consequent improvement in performance among students. It also demonstrates a positive effect on communication skills and attitude towards work. Consequently, the study brings out the understanding that ethical issues have to be observed when using ChatGPT in education.

Index Terms- Generative AI, ChatGPT, Education, Impact of ChatGPT, Human-Computer Interaction, Technology, Higher Education

I. INTRODUCTION

ChatGPT created by OpenAI is an example of an advanced Generative AI which enables the user to interact in a conversation or problem-solving format through writing an input based on a huge amount of data (Tlili, 2023). This Natural Language Processing model is famous for the fact that it would emulate human conversation, including its responses turning contextually and improving on the conversation (Qadir 2022).

Due to its capability to generate data in real-time it is a widely applicable in many industries among them being education.

Concerning the concept of education, ChatGPT signifies great opportunities in furthering the processes of teaching and developing knowledge. To teachers or educators, it offers a resourceful support in the lesson planning, time saving through the automation of tasks, alongside the ability to enhance lesson delivery by creating enlightening instructional contents (Zhai, 2022). However, the integration also brings into concern the best approach in addressing the effects of implementation on the students' learning outcomes and their overall development. Though ChatGPT helps to save the time to perform a specific task and gives immediate responses in some cases, it encourages students to analyze the received data and develop the skills to solve problems independently.

Both students and educators have valued ChatGPT in enhancing academic accomplishment with regards to assignment/assessment submission as well as proposing instruction on project initiation and execution (Tlili et al., 2023). These characteristics make it preferred in places of learning; it can generate nice ideas, provide a clear framework as well as enhance the productivity of tasks that used to consume a lot of time.

However, to the current date, nothing else has been carried out exploring the moderating and mediating factors of messaging technology; in particular, the impact of ChatGPT on productivity of the students, quality of their work, working communication skills, work attitudes and work progress. This research will therefore also help fill this gap by methodologically exploring these impacts among university students in Pakistan.

Research Objectives

Researchers developed following research objectives based on research problem:

- To measure productivity level in the students at university level using ChatGPT
- To evaluate learning outcomes in the students at university level using ChatGPT

- c) To analyse communication skills in the students at university level using ChatGPT
- d) To examine work ethics in the students at university level using ChatGPT

II. LITERATURE REVIEW

Rapid advances in artificial intelligence (AI) and natural language processing (NLP) technologies in recent years have become the cause of the development of conversational agents known as chatbots. These were generally developed on web platforms to impart knowledge on various subjects (Kuhail et al., 2023). Many of them are serving in almost all the domains where tech is integrated in any way. Among them, ChatGPT based on the GPT 3.5 architecture has become a widely used AI tool that can simulate human speech and provide highly intelligent responses in multiple fields leading to the satisfaction of its users (Smith, 2023). As the number of users of ChatGPT and similar technologies continues to grow, it is important to assess their impact on various aspects of society, including education as pros and cons of every tool need to evaluate to make future predictions (Kohnke et al., 2023).

Certainly, ChatGPT is significantly beneficial to educators, learners, researchers, and users because it can enhance the improvement in formative and summative evaluations, 24/7 available, helps in idea formation, increased pedagogical methodologies also assist to generate academic outlines (Sok et al., 2023). In many other fields, ChatGPT also play a crucial role in many other fields such medical, one study in this field concluded that ChatGPT assists novel ideas for systematic reviews accurately and advocating the applications outside of plastic surgery research (Gupta et al., 2023), as well as in business sector (George et al., 2023).

In this connection, this literature review comprises of detailed review of the studies conducted on four variables namely, productivity level, learning outcomes, communication skills and work ethic of university students using ChatGPT.

Productivity Level and ChatGPT

Integrating ChatGPT into educational institutions raises important questions about its potential impact on student behaviour as there are always more than aspects of the use any entity. The first thing to note is the power shift that is unimaginable. ChatGPT & other AI language models are helpful for both students and teachers. However, it is important to remember these are not perfect, may make mistake and provide inaccurate information. But still help to achieve productivity level (Qadir, 2023). By gaining instant and comprehensive information through ChatGPT, students can increase their academic productivity leading to enhanced work they produce as part of either their assignments or projects. However, it is important to know whether these productivity gains are due to a comprehensive or superficial knowledge of the subject as AI cannot beat human intelligence.

Learning Outcomes and ChatGPT

The second point related to the impact of AI on students' learning outcomes. ChatGPT's ability to provide answers and explanations ensures student understanding and engagement but it is needed to assess how far learning occurs. ChatGPT provides an opportunity for students to investigate various examples and prepare for submissions. It may present an opportunity for instructors to integrate technology into the classroom (Alafnan et al., 2023). ChatGPT and AI have the potential to enhance students' learning effectiveness, advance the distribution of educational resources, and improve the oversight of educational quality (Zhai, 2023).

In the context of evaluating the overall impact of generative AI on student learning, it is imperative to parse the overall impact into smaller chunks to perform a micro-study of the multiple small effects that combine to create a bigger impact (Noy et al., 2023). In this context, evaluating students' learning can be a step further with reference to ChatGPT as students are increasingly becoming dependent on it for doing their educational tasks.

Communication Skills and ChatGPT

When students encounter ChatGPT, their communication skills are also impacted in one way or the other, though they are only writing and reading skills when taken in the context of language. This engagement can have an ultimate impact on the away students interact with each other, teachers, and other community members, collaborate and reciprocate their ideas. Chatbots are effective in improving students' language proficiency and improve writing skills and communications such as ChatGPT (Bozic, 2023). ChatGPT can also be used to help students learn about different writing styles and techniques (Shidiq, 2023).

Work Ethic and ChatGPT

Another key point was work ethics that needs to be considered as ChatGPT's ease of use is a proof of the tool's commitment to academic integrity, and the fight against fraud and plagiarism.

SYSTEMATIC REVIEW

The study used a systematic literature review method to systematically review essential questions with regards to ChatGPT and its effects on student work. This methodological approach promises to present a clear and systematic analysis of existing research, thus providing a comprehensive and up-to-date picture of the state of knowledge regarding the topic under study. By following the systematic review principles, biases were limited, and a strong framework for the subsequent analysis and conclusion was set up.

The systematic literature review began with asking specific research questions related to ChatGPT impacts on productivity, learning, language proficiency, and work ethic among students based on the PCC (Population, context, concept) criteria. These questions guided a systematic approach in the retrieval of information from diverse databases ranging from journals, conferences, and other academic sources. An appropriate and extensive literature search using organized key words and terms

guaranteed broad capture of literature relevant to the application of AI in educational settings.

The literature review was conducted systematically, and peer reviewed articles were selected basing on their titles and abstracts by use of PRISMA flow chart that showed the number of articles considered for review, excluded and included. Hence, this method located knowledge gaps which were then presented as areas for further research to frame the ChatGPT narrative in education in the pipeline manner.

The decision to use both systematic review and traditional literature review approaches was informed and intentional. A systematic review was considered more appropriate for its academic methodology, which aimed at providing a systematic approach to identify and analyze a wide range of literature to the subject matter under study. This approach is useful in reducing preconceived notions and increases the credibility of the findings from the reviewed studies.

On the other hand, the traditional literature review offered an overall perspective and awareness of the studied subject through the presentation of synthesized findings from prior studies. Thus, the combined approach allowed analyzing the effects of ChatGPT on the students' work patterns, discussing the prospects of its usage in learning, and identifying the further research directions.

Altogether, the combination of these methodologies benefited the study by offering a multifaceted perspective of the impact of ChatGPT on learning spaces in higher education. They also highlighted the need for further studies in this fast-growing field to help chart the course for future studies and shape educational practices and policies.

Research Questions

RQ1: What is the impact of ChatGPT on university students' productivity level?

RQ2: What is the impact of ChatGPT on university students' learning outcomes?

RQ3: What is the impact of ChatGPT on university students' communication skills?

RQ4: What is the impact of ChatGPT on university students' work ethic?

Population, Concept and Context

Dissection of above questions in to apply PCC criteria is given below:

PCC criteria

Population	Higher education learners of all educational domains
Concept	Productivity level, learning outcomes, communication skills, work ethic

Context Use of ChatGPT in doing educational tasks

Inclusion/Exclusion Criteria

Inclusion criteria	Exclusion criteria
Studies published in peer-reviewed journals or reputable conference proceedings.	Studies published in non-peer-reviewed sources, such as personal blogs, opinion pieces, or forums.
Published works	Unpublished works
<i>Grey Literature</i>	
Research conducted using quantitative, qualitative, or mixed methods approaches	Studies that do not provide sufficient details on methods, data collection, or analysis techniques
Language: English	Research published in languages other than English, unless translation services are available
Studies conducted within last 10 years (2013-2023)	Studies published before 2013, unless they provide important historical context for the topic
Studies that examine the impact of AI (ChatGPT) use on productivity, learning outcomes, communication skills, and work ethic	Studies that do not specifically focus on the impact of AI use on productivity, learning outcomes, communication skills and work ethic
Research conducted on students or learners in formal educational settings (e.g., schools, colleges, universities)	Research conducted on non-student populations, such as professionals in the workplace

Search Strategy and Terms

A. Changes in University Student's Productivity due to the Use of AI

In the age of artificial intelligence and chat agents like ChatGPT, the impact of technology on student attitude is gaining attention in research domain. An important area to explore is the changes that students may experience in their productivity before, during and after when using ChatGPT in their academic work. This connection, enhanced efficiency, and time-saving potential, effect on engagement and motivation, and concerns for overreliance and dependency have been explored by the researchers (Farrokhnia et al., 2023).

Enhanced Efficiency and Time-Saving Potential

The potential impact of artificial intelligence is to increase efficiency and save time of the users. A significant advantage of having fast and rich information access as of ChatGPT is the time students save in their study processes, which makes it

possible for them to spend more time on other activities they would prefer to engage in. These productivity gains enhance time efficiency hence freeing the more time for other constructive academic tasks such as critical thinking, knowledge analysis and synthesis which can in the long run be beneficial for the learners. More to the point, it is necessary to know whether the increased productivity results in the enhanced comprehension of the material or merely results in the sort of learning that can be outlined as a detailed insight into this phenomenon can point at facts. ChatGPT assists users in receiving information correctly, as it has the possibility to process inquiries more effectively (Jalil et al., 2023).

ChatGPT is highly responsive and even collaborative and creative in many meaningful ways but does not learn to think critically and solve problems and thus must be monitored in this regard. While using ChatGPT, it is more significant to verify the provided information with accurate source (Firaina et al., 2023). The impact of ChatGPT on the quality and depth of student assignments needs to be critically assessed to maximize its benefits in the realm of learning (Ali et al., 2023).

Effect on Engagement and Motivation

ChatGPT as a source of information and support can influence students' willingness to engage in course materials and academic assignments. The convenience of readily available answers reduces cognitive load and increases the motivation associated with multitasking. However, it needs to be further explored if this increased reliance on ChatGPT reduces students' intrinsic motivation and self-efficacy. When students find ChatGPT distracting them, it lowers their self-esteem in terms of competence and autonomy. It is important to study how the presence of ChatGPT as an external support system affects students' intrinsic motivation to take responsibility for their own learning and studies (Fauzi et al., 2023).

B. Changes in Learning Outcomes of learner due to the Use of ChatGPT

AI Chatbots give assistance to enhance learning, efficient teaching, and minimize ambiguity from interaction. These have a significant impact on learners' learning outcomes by providing them helpful information, giving them ideas and answers of their academic concerns and problems (Sandu, 2019). Now ChatGPT is also evolving in education and assists students and teachers. ChatGPT is valuable tool for students, teachers and administration and improve personalised learning (Tajik et al., 2023).

Enhanced Problem-Solving Skill

The high-powered language model ChatGPT facilitates learners to increase their problem-solving skills. ChatGPT provides learners quick access and responses to their complex problems. To interact with ChatGPT, learners can also develop critical thinking skills and insights of difficult tasks. ChatGPT has an ability to overcome the workload of users by aiding in daily based questions for the users (Limna et al., 2023).

Effect of ChatGPT on Learning Environment

The rate of Inclusion of ChatGPT in education is increasing day by day. ChatGPT significantly influences the curriculum design, teaching strategies and assessment methods in this field. Students need to learn digital literacies and integrate cutting edge technologies such as ChatGPT into their future practices. ChatGPT has the potential ability to improve learning environment (Rospigliosi, 2023). ChatGPT is well suited which helps students to acquire digital skills. ChatGPT assists learners to improve their learning experience and environment (Lee, 2023).

C. Impact of ChatGPT on University Student's Communication Skills

ChatGPT assists students to interact with their peers. Students can collaborate with their peers and share their ideas about any topic with each other. So, ChatGPT has a potential to improve learner's communication skills (Tlili et al., 2023). ChatGPT has an ability to identify and respond to the emotions of the users which can help to enhance their communication effectively (Macdonald et al., 2023).

Language Improvement using ChatGPT

ChatGPT is a powerful and versatile tool which improves language skills. Students can enhance their language skills to have extensive knowledge about vocabulary, spelling mistakes like grammar check and, refine their writing skills which are provided by ChatGPT (Cotton et al., 2023). Artificial intelligence tools like ChatGPT are helping scientists and provide them instant feedback to improve their writing review articles, also increasing their work quality and efficiency (Huang et al., 2023).

D. Impact of ChatGPT on University Student's Work Ethic

The advancement of technology is transforming the world and our way of thinking. Students are totally dependent on technology like ChatGPT. They use this technology to complete their academic tasks and writing assignments etc. There is no research conducted to measure the impact of ChatGPT on students' work ethic, so this study would help to get information whether it has positive impact or negative impact on students' work ethic.

E. Concerns of Overreliance and Dependency

One of the potential issues with generative AI is the risk of trust and dependency. Undoubtedly, ChatGPT has remarkable functionality and easily accessible to students and researchers. However, there are also ethical considerations to keep in mind while using it such as potential biasness (Benuyenah, 2023). For instance, ChatGPT can provide support, but students may become too dependent on the tool and not develop their own problem-solving skills that can be disastrous for their mental health.

Over reliance on ChatGPT can prevent students from thinking critically, analyzing complex data, and conducting independent research making them lethargic and mentally dull. Additionally, there are risks associated with academic integrity as plagiarism and fraud can also occur. The temptation to use ChatGPT for

quick access or plagiarism could compromise the ethical basis of scientific research. It is important to assess how ChatGPT affects a student's work ethic, integrity, and honesty (Cotton et al., 2023).

III. METHODOLOGY

The mixed-method approach was adopted for this study. Because mixed-method approach assists researchers to generalise findings with sufficient depth (Enosh et al., 2014). The Quasi-experimental study opted to analyse the work-habits of university students. For quantitative study, researchers developed a survey-based questionnaire which align with the objectives of this study.

This tool consists of twenty-four (24) statements in which six (6) [1-6] number of items are for productivity level, six (6) [7-12] items for learning outcomes, six (6) [13-18] items for communication skills and six (6) [19-24] items for work ethic of students. Pilot testing used to analyse the validity and reliability of the tool. Pilot testing shows the high reliability of the tool (.889). Moreover, the validity of the instrument was established by the experts.

For Qualitative data, researchers formed questions for semi-structured interview on productivity level, learning outcomes, communication skills and work ethic.

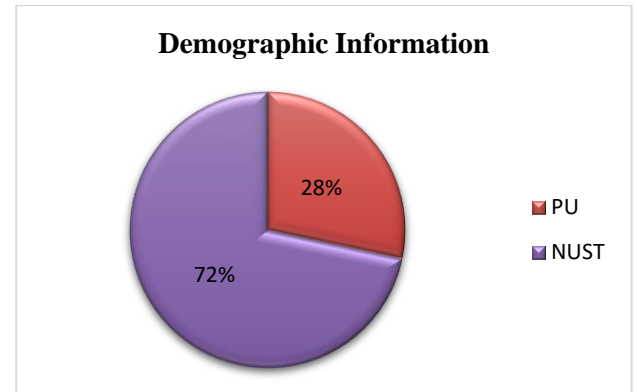
a) Sample

Researchers conducted an interactive session with both universities students and selected students who were using ChatGPT for their academic purpose. From NUST university there was 2 groups of students selected which were enrolled in BSCS 2nd semester. The number of respondents were 43 for 1st NUST group and for 2nd NUST group, there were 38 number of respondents. So, the total number of respondents from NUST were 81(71.7%). And the total number of respondents were 32 (28.3%) from PU and they were enrolled in MTE 3rd semester. The total number of respondents in this study was 113.

Demographics

Sr. #	University	Departments	Degree Program	No. of respondents
1	National University of Sciences and Technology (NUST)	School of Electrical Engineering & Computer Sciences (SEECS)	BSCS	81 N1 (43) N2(38)
2	University of Punjab (PU)	Institute of Education & Research (IER)	Master of Technology Education (MTE)	32

Total Number of respondents N=113; N1= 1st NUST Group; N2= 2nd NUST Group



Demographics Information

b) Data Collection

Data were collected through different mediums. For quantitative data, researchers shared a google form with students to fill out questionnaire after conducting an interactive session. In session, students shared their thoughts towards innovative technology AI/ChatGPT. And performed an essay-based activity which was related to integration of ChatGPT in education specifically its impact on higher education students. For qualitative data, researchers interviewed students and recorded their responses. The number of participants in interview was 20.

IV. DATA ANALYSIS AND INTERPRETATION

The mixed method approach was opted to collect data from two different universities of Pakistan. The students at University of Punjab (PU) and National University of Science and Technology (NUST) were selected for this study. The total number of students was 113. The aim of this study was to measure the student's work-habits in the era of ChatGPT especially their productivity level, learning outcomes, communication skills, and work ethic.

Quantitative Analysis

The inferential statistical analysis was used to compare groups with each other and accessing the four variables (i) productivity level (ii) learning outcomes (iii) communication skills and (iv) work ethic comparatively.

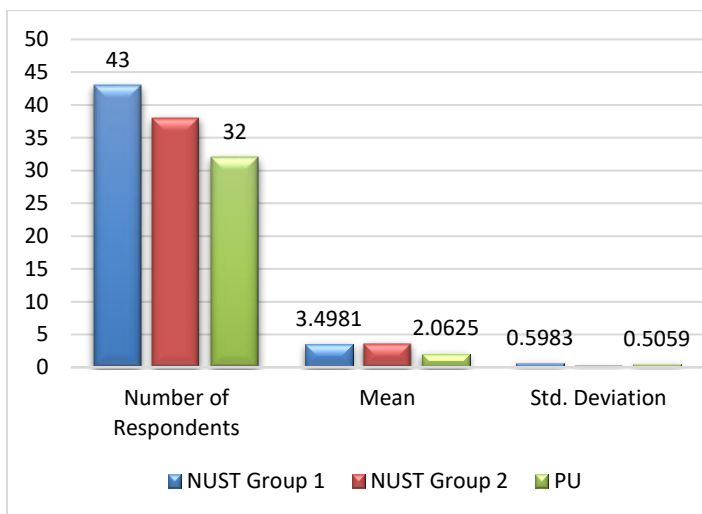
A. Compare the NUST Group with PU Group

To facilitate the comparison of NUST student groups, it is essential to first examine the basic statistics of the variables. Table 1 shows the data statistics for groups: NUST Group 1, NUST Group 2 and PU (Punjab University). The sample size varies, with 43 respondents for NUST Group 1, 38 for NUST Group 2, and 32 for PU. On average, respondents rated PU lower (2.06) compared to NUST Group 1 (3.50) and NUST Group 2

(3.64). NUST Group 2 has the smallest standard deviation, indicating less variability in responses.

	Number of Respondents	Mean	Std. Deviation
NUST Group 1	43	3.4981	0.59830
NUST Group 2	38	3.6414	0.26539
PU	32	2.0625	0.50590

Table 1 Basic statistics of Groups



Group Comparison

Compare both NUST groups with PU students' group

Table 2 shows the comparison of both NUST groups with PU students' group. The Mann-Whitney U test **12.00** with a p-value of **.000** indicates a significant difference between the ratings of PU (Punjab University) and the combined NUST groups. It is suggesting that these two groups have **statistically distinct** scores. It is clearly shown that both NUST and PU students have different perceptions towards ChatGPT. Because NUST students are integrating AI tools on daily basis to enhance academic environment while PU students are still using traditional strategies and have less inclusion of AI in their lives

Table 2 Statistic for comparison of NUST groups with PU group

Test Statistics ^a	
	PU
Mann-Whitney U	12.000
Wilcoxon W	540.000
Z	-7.243
Asymp. Sig. (2-tailed)	.000
a. Grouping Variable: Combined	

B. Compare the NUST Group 1 with NUST Group 2

The Mann-Whitney U test comparing NUST Group 1 and NUST Group 2 yields a non-significant result with a p-value of **.466**. This suggests that there is no significant difference in the ratings between these two NUST groups, as the p-value is higher than the typical significance level of 0.05 as shown in Table 3. Both groups have similar perceptions towards ChatGPT. Because both groups are using AI in their education.

Table 3 Statistic for comparing NUST Group 1 with NUST Group 2

Test Statistics ^a	
	NUST Group 1
Mann-Whitney U	740.000
Wilcoxon W	1686.000
Z	-.730
Asymp. Sig. (2-tailed)	.466
a. Grouping Variable: NUST Group 2	

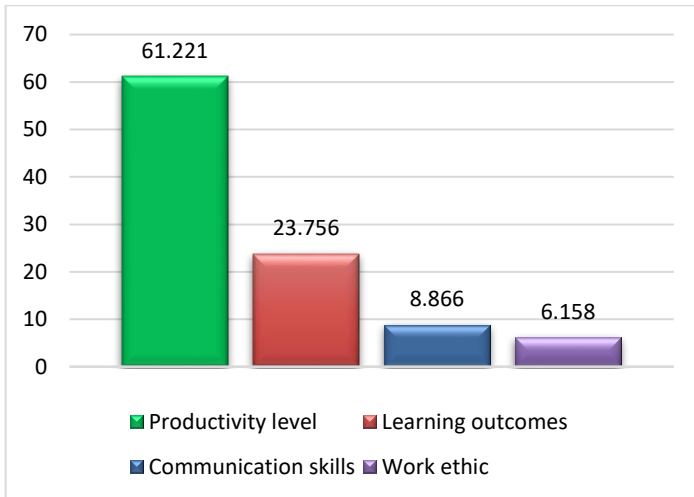
F. Impact of ChatGPT on university students' productivity, learning, communication, and work ethic

Table 4 shows results from Principal Component Analysis show that ChatGPT significantly influences students' productivity levels, explaining 61.22% of the variance. Additionally, it positively affects learning outcomes (23.76%), communication skills (8.87%), and work ethic (6.16%). The cumulative variance reaches 100%. These findings suggest that ChatGPT plays a crucial role in enhancing students' productivity, learning outcomes, communication skills, and work ethic, highlighting its multifaceted positive impact on the academic environment.

Table 4 Impact of ChatGPT on University Students' Work Habits

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Productivity level	2.449	61.221	61.221	2.449	61.221	61.221
Learning outcomes	.950	23.756	84.977			
Communication skills	.355	8.866	93.842			
Work ethics	.246	6.158	100.000			

Extraction Method: Principal Component Analysis.



Impact of ChatGPT on university students' productivity, learning, communication, and work ethic

G. Qualitative Analysis

To analyse the qualitative data, data was transcribed and translated into English because mostly students interviewed in Urdu language, they were more comfortable with it. Comments and key points given by students were named as students' responses after transcribing the data.

Table 5 Students' responses of interviews

Category	Exemplar Quotes/ Students' Responses
Productivity	<p><i>"ChatGPT helps to save time"</i></p> <p><i>"ChatGPT helps to enhance us professional and personal growth".</i></p> <p><i>"ChatGPT is gaining knowledge to crosscheck reading material"</i></p> <p><i>"ChatGPT improves my productivity" (Repeats)</i></p> <p><i>"It helps to generate better ideas like for semester project, so it is becoming us more productive"</i></p> <p><i>"Creative level goes downfall but not denying it helps"</i></p>
Learning	<p><i>"ChatGPT gives answers in easy wording"</i></p> <p><i>"If we are struggling with some topic ChatGPT is a source to help us out"</i></p> <p><i>"ChatGPT helps us to generate formal emails" (Repeats)</i></p> <p><i>"Assisting to complete my tasks" (Repeats)</i></p> <p><i>"Tasks which takes one or two days,</i></p>

	<i>ChatGPT helps us to complete within a few time"</i>
Communication Skills	<p><i>"ChatGPT improve communication skills in a sense to know innovative words" (Repeats)</i></p> <p><i>"It helps to write messages better and make us able to communicate well"</i></p> <p><i>"I feel like it gives formal and polite responses so, help me a lot to structure sentences"</i></p> <p><i>"Helps in writing" (Repeats)</i></p> <p><i>"I don't feel any change in my communication skills using ChatGPT" (Repeats)</i></p>
Work ethic	<p><i>"Motivating us towards tasks because it saves time"</i></p> <p><i>"Neutral stance on that but it helps to work"</i></p> <p><i>"Kind of, it enhances work ethic" (Repeats)</i></p> <p><i>"Dependent on ChatGPT, now I think it will complete my work"</i></p>

Number of Students N=20

V. DISCUSSION AND CONCLUSION

This research study was intended to inspect the university students' work habit in the era of ChatGPT. The four factors were analysed in this study which were productivity level, learning outcomes, communication skills, and work ethic. Researcher compared two different university students' responses to find out their perceptions towards ChatGPT. Between the comparison of NUST combined groups, results showed no significant distinguish using ChatGPT. Students has influenced by ChatGPT, it is also concluded that both groups have same and positive perceptions towards ChatGPT. While comparing NUST combined groups with PU, indicated the significant differences. The significant disparity suggests that these two groups hold diverse opinions or attitudes towards the technology like ChatGPT. Because integration of ChatGPT in PU students' lives is less than NUST Students. NUST Students advanced and innovative technologies more for their academic purposes to enhance and improve their learning styles. While PU students have less inclusion of ChatGPT and other AI tools, but they are accepting new technologies as they mentioned in interviews, technologies have potential ability to enhance their professional and personal growth.

Results concluded that ChatGPT play crucial role to improve the productivity level, learning outcomes, communication skills. It also concluded that ChatGPT has positive impact on university students' work ethic. But comparatively, ChatGPT has more

impact on university students' productivity level which is 61% as shown in previous table 4. Various studies conducted which shows that ChatGPT has ability to increase the learning productivity of students (Salmaan et al., 2023). One more study concluded that the usage of ChatGPT improved productivity by 37% and 80% decreased the time spent on specific tasks (Noy et al., 2023). Additionally, this study and existing studies consequences showed that work habits of university students can be improved using ChatGPT.

The ethical considerations need to keep in mind while using ChatGPT because where it has positive impact on students, it also has negative impact on students as students mentioned in interviews that ChatGPT is reducing their creativity such as they cannot think out of the box because it limits students' ability to think and problem-solving skills because they are totally dependent on ChatGPT. Students must keep in mind that ChatGPT' responses can be inappropriate and might not always be accurate so, other sources require to crosscheck their content.

Benefits of the Research

- This study is beneficial for educators because it will help educators to improve academic performance, evaluate students' productivity level, learning outcomes and communications. This study is efficient to upgrade learning outcomes.
- This study can also be useful for AI developers to generate effective educational tools that correspond students' work-habits in the era of ChatGPT.
- No prior study has been conducted on work ethic aspect which makes this study a groundbreaking contribution to the existing scholarly knowledge.

Future Recommendation

Based on the results of the study, there are several recommendations for the future research. The future recommendations are:

- i. There is lack of studies related to ChatGPT and its impact on students' productivity level, learning outcomes, communication skills, and work ethic in Pakistan.
- ii. Future research endeavors in this area should place emphasis on distinguishing between mere factual memorization and genuine comprehension of concepts, as these factors can significantly influence the outcomes and findings. It is crucial to consider and address the potential impact of these factors on the results of future studies.
- iii. This study was limited to the university students of IER, the University of the Punjab, Lahore and SEECS, the National University of Sciences and Technology (NUST), Islamabad. The researchers also recommend further research in other institutes within the discipline to determine the impact of ChatGPT. Additional

research may be able to verify or reject the results of this study.

- iv. The results of this study showed significant impact of ChatGPT on students' work habits. These outcomes are, to some extent, unanticipated. It is recommended by the researchers to conduct additional research with a bigger sample size. Future studies may be able to support or reject the results of this study.

APPENDICES

APPENDIX A

Essay Activity

Time: 00:15 Minutes

Briefly write down the answers to the following questions:
Q1: What is the impact of ChatGPT on university students' work-habits?

Work Habits = Productivity, Learning Outcomes, Communication Skills, and Work Ethics

Q2: Highlight the pros and cons of using ChatGPT?

Pros:

Cons:

Q3: Discuss ethical considerations to keep in mind while using ChatGPT?

Academic Integrity

Bias

Q4: What are your thoughts on ChatGPT? Do you think it is a good tool to use? Would you like to use it in future? Yes/No.

Justify your points.

APPENDIX B

Questionnaire

Please respond to all the statements. The information provided will be kept confidential and anonymous. Your cooperation will be highly appreciated. There are five options against each question. Select an option according to your preference.

5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree

Sr#	Statements	SA	A	N	D	SD
Factor 1: Productivity Level						
1	ChatGPT makes me able to manage my time.					
2	ChatGPT assists me to improve my study habits.					
3	ChatGPT allows me to finish my work quicker.					
4	Tasks take longer to complete when I use ChatGPT.					

5	I am eager to complete my work because of ChatGPT.					
6	I can finish more tasks in a shorter time with ChatGPT.					
Factor 2: Learning Outcomes						
7	ChatGPT enables me to enhance my learning environment.					
8	ChatGPT helps me to improve my problem - solving skill.					
9	ChatGPT makes me capable of independent learning.					
10	It is easier to understand concepts by using ChatGPT.					
11	I can learn new concept with the help of ChatGPT.					
12	ChatGPT provides me resources for my learning needs.					
Factor 3: Communication Skills						
13	ChatGPT assists share my ideas effectively.					
14	ChatGPT makes me able to improve my writing skills.					
15	ChatGPT helps me to improve my vocabulary.					
16	ChatGPT helps me in paraphrasing my ideas.					
17	ChatGPT enables me to write in a grammatically correct manner.					
18	ChatGPT helps me to refine my written work.					
Factor 4: Work Ethic						
19	ChatGPT makes me self-disciplined.					
20	I am more dependent on ChatGPT to complete my work.					
21	I present work generated by ChatGPT as my own.					
22	Using ChatGPT is plagiarism.					
23	Work generated by ChatGPT should be properly cited.					
24	There is no need to fact-check ChatGPT.					

Thank you for your cooperation!

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