



ROLE OF CHATGPT IN DIVERGENT PRODUCTION ABILITIES AMONG P.G. STUDENTS AND RESEARCH SCHOLARS

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Abstract: This study examined the usage patterns and perceptions of ChatGPT among university students. A sample predominantly comprised of 21-25-year-olds (75%) and 25-35-year-olds (25%) was surveyed, with a female majority (69%). The participants hailed from diverse academic streams: Arts (28%), Science (29%), Commerce (21%), and Technical (22%), primarily at the postgraduate level (80%). Notably, 25-35-year-olds used ChatGPT more frequently, potentially due to research commitments compared to their younger counterparts. Friends (32.66%) and YouTube videos (30%) were the primary sources of ChatGPT awareness. The majority (46%) had been using ChatGPT for less than six months for various purposes including idea generation (32%) and academic ideation (30%). Interestingly, 91% of students endorsed ChatGPT's recommendations. Significant differences were observed in divergent thinking abilities between masters and research scholars, and among students from different universities. Usage duration also influenced divergent thinking, with longer durations correlating with increased creative output.

Keywords – Chatgpt, Divergent production abilities, AI Tools.

1.INTRODUCTION

ChatGPT (Chat Generative Pre-Trained Transformer) is an artificial intelligence chatbot developed by Open AI and launched on November 30, 2022. It is notable for enabling users to refine and steer a conversation towards a desired length, format, style, detail level, and language. ChatGPT is an AI chatbot that uses natural language processing to create human like conversational dialogue. The language model can respond to questions and compose various written content, including articles, social media posts, essays, code and emails.

Some study's Indicate that integrating Artifact intelligence, chatGPT, and the Critical Thinking approach can enhance the quality of academic output generated by Lecturers and learners. This amalgamation can also facilitate the process of composing academic papers more efficiently. Lecturers and learners must consider chatGPT and Artifact intelligence policy guidelines while engaging in scholarly investigations. (Marbun, 2023)

Research demonstrates that AI may be a useful tool in the classroom, despite some people's concerns that technology-dependent pupils would be produced by AI like Chat GPT. As long as teachers keep making critical thinking and interpersonal connection a priority. All students' educational experiences may be improved and enhanced with the aid of AI. (El-Seoud et al., 2023)

Divergent Production Abilities: Guilford's Structure of the Intellect model proposed that what he called "divergent production"—thinking of a wide variety of ideas in response to an open-ended question or prompt—was a significant contributor to creativity (Guilford, 1956, 1968).

AI, metacognition may come to play an increasingly important role in problem-solving (Rafner et al., 2021).

1.1 Role of ChatGPT in the education sector: ChatGPT has the ability to help educators by creating instructional content, offering suggestions and acting as an online educator to learners by answering questions and promoting group work, there are clear drawbacks to its use, such as the possibility of producing inaccurate or false data and circumventing duplicate content (plagiarism) detectors where originality is essential. (Gill et al., 2023)

1.2 ChatGPT and the Challenge of Creative Thinking: This study investigates claims of generative AI's creativity, specifically ChatGPT (GPT3.5 and GPT4), through the administration of the Divergent Association Task (a verbal divergent thinking test). Results were compared to those of a substantial human reference group. While ChatGPT outperformed the human sample in mean DAT scores, numerous concerns remain that challenge the attribution of 'creativity' to ChatGPT. (H. Cropley, 2023)

1.3 Variations in Divergent Cognitive Abilities Among College Students: In today's globalized world, being a creative individual is highly valued, and this emphasizes the growing importance of divergent thinking in education. The concept of creative thinking was first defined by Torrance as the ability to identify problems, make educated guesses, generate fresh ideas, and effectively communicate the results (1965, 1966, 1988, as cited in Wang, 2011). However, creativity can vary among individuals and groups, and studying these differences helps us understand their underlying causes. One particular category of group differences in creativity pertains to gender variations. Boys and girls may exhibit different levels of creativity due to sex-related biological factors or gender-related socio-cultural influences. This research focuses on exploring creative differences between boys and girls, with a specific emphasis on examining how gender influences creativity.

ChatGPT improves the quality, elaboration, and originality of the solutions to the creative problem solving task; whether ChatGPT boosts self-efficacy for task resolution; whether ChatGPT affects the accuracy of the self-evaluations and whether using ChatGPT makes the task resolution more interesting, easier, and requiring less mental effort. (Dechterenko et al., 2023)

2. MATERIALS AND METHODS

2.1 RESEARCH DESIGN: In this research, a Descriptive research design and Exploratory research design was used to the proposed research.

2.2 STEPS OF SAMPLE SELECTION:

Step 1. Agra and Firozabad city was conveniently selected as the locale of the study.

Firstly, select Agra and Firozabad city which was convenient for sample selection.

Step 2. In Agra There are two universities and in Firozabad there in one university running parallelly for higher Education Agra and Firozabad Universities were conveniently chosen for the sample of the study.

- Dayalbagh Educational Institute, Agra
- Dr Bhimrao Ambedkar university, Agra
- J.S. university, Firozabad

Step 3. Three universities were selected from the two cities chosen by conveniently and 50 sample size will be selected from each University.

Step 4. A total of 50 students each were selected from the Arts (10), Commerce (10), Technical (30), Science (10) and Research Scholars (10) departments of each University

Step 5. A total of 10 samples is taken from each department. It will be divided into two sections PG students (40) or research scholars (10)

2.3 CONSTRUCTION & CONTENT OF TOOL: Tool constructed by the researcher for the study 2 tool will be constructed

2.3.1 Demographic profile: The questionnaire was prepared to collect the personal details of students. It contained general information: Name, Age, Sex, Qualification, Income of the family, Occupation of parents & No. of the family members.

It was divided into two sections:

- First section – Details of students: Name, Age, Class, name and address of the college

Details of parents: occupation of parents, family type.

- Second section – it comprised of general open-ended and close-ended statements to collect information regarding the usage of ChatGPT by higher education students.

2.3.2 STANDARDIZED SCALE: DIVERGENT PRODUCTION ABILITIES DPA-s by Dr. K.N. Sharma, Department of Psychology University of Rajasthan.

2.4 PROCEDURE OF DATA COLLECTION:

The data was collected by an Offline survey method.

It was collected through a standardized questionnaire which was given by Dr. K.N. Sharma.

- Firstly, select Agra and Firozabad city which was convenient for sample selection.
- In Agra There are two universities and in Firozabad there in one university running parallelly for higher Education Agra and Firozabad Universities were conveniently chosen for the sample of the study.

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• A total of 50 students each were selected from the Arts (10), Commerce (10), Technical (30), Science (10) and Research Scholars (10) departments of each University.

• A total of 10 samples was taken from each department. It divided into two sections PG students (40) or research scholars (10).

3. RESULTS AND DISCUSSION

3.1 Compare the duration of ChatGPT among students

Table 3.1 Distribution of sample on the basis of Age

	No.	Mean	S.D.	t/p	
21-25	114	1.82	0.6	2.00	S
25-35	36	2.11	0.8		at (0.05)

Table no.3.1 shows that there was a significant difference between the 21 to 25 and 25 to 35 years age groups of university students on 0.05 level because students in the 25 to 35 years age group use ChatGPT more than students in the 21 to 25 age group because individuals aged 25 to 35 are usually engaged in research-related work, whereas those in the 21 to 25 age group often have tasks that primarily involve working with related to study text only. This is why they may have less time to dedicate to ChatGPT according to duration.

Table 3.2 Gender

	No.	Mean	S.D.	t/p	
F	104	1.87	0.68	0.51	NS
M	46	1.93	0.65		

Table no. 3. 2 shows that there was no significant difference between males and females because both equally used ChatGPT according to duration.

Table 3.3 Stream of education

	No.	Mean	S.D.	t/p			
Arts	42	1.83	0.72	-----	0.47	0.36	0.72
Commerce	31	1.91	0.71	NS	-----	0.20	0.23
Science	44	1.88	0.57	NS	NS	-----	0.47
Technical	33	1.95	0.71	NS	NS	NS	-----

Tableno.3.3 shows that there was no significant difference between males and females because all equally used ChatGPT according to duration.

Table 3.4 LevelofAcademics

	No.	Mean	S.D.	t/p	
Masters	120	1.86	0.63	0.87	NS
Research Scholars	30	2	0.82		

Tableno.3. 4 shows th at there was no significant difference between Masters and Research scholars because both equally used ChatGPT according to duration.

Table 3.5 University Enrolls

	No.	Mean	S.D.	t/p		
DEI	50	1.92	0.75	-----	0.14	0.76
DBARU	50	1.94	0.70	NS	-----	0.95
J.S.	50	1.82	0.55	NS	NS	-----

Tableno. 3.5 shows that there was no significant difference between DEI, DBARU, and J.S universities because both equally used ChatGPT according to duration.

3.2 Distribution sample based on awareness of ChatGPT.

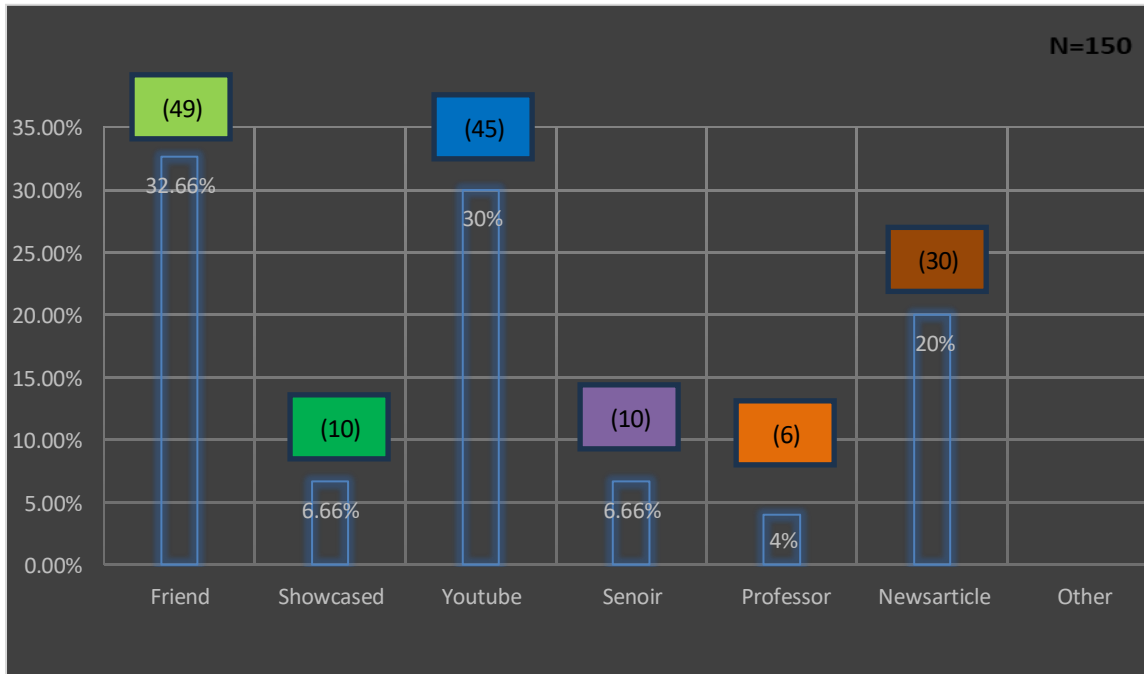


Figure 3.1 shows that how students became aware of ChatGPT, and we found that 32.66% of students learned about ChatGPT through their friends, 6.66% through tech blogs, 30% through YouTube videos, 6.66% through their seniors, 4% through their professors, and 20% through news articles.

3.3 Distribution the sample based on the time of start using ChatGPT.

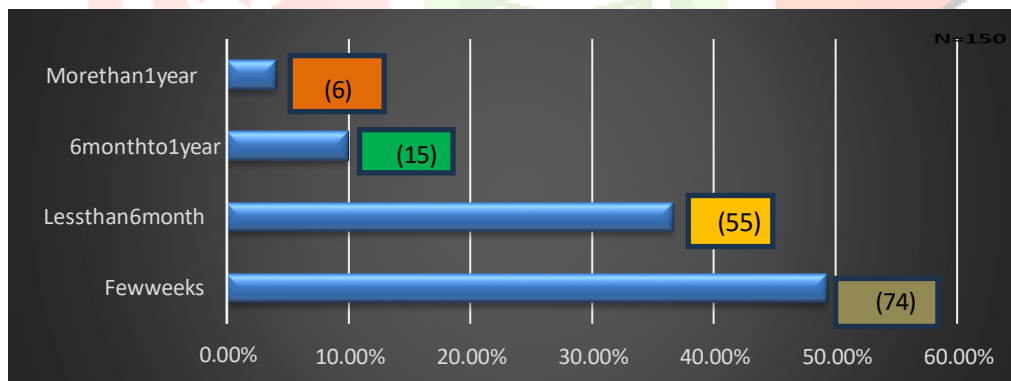


Figure .3.2 shows that 49.33% of students have been using ChatGPT for a few weeks, 36.66% for less than 6 months, 10% for a period between 6 months and 1 year, and 4% have been using it for over 1 year.

3.4 Distribution the sample based on daily ChatGPT usage hours for academic or research purposes.

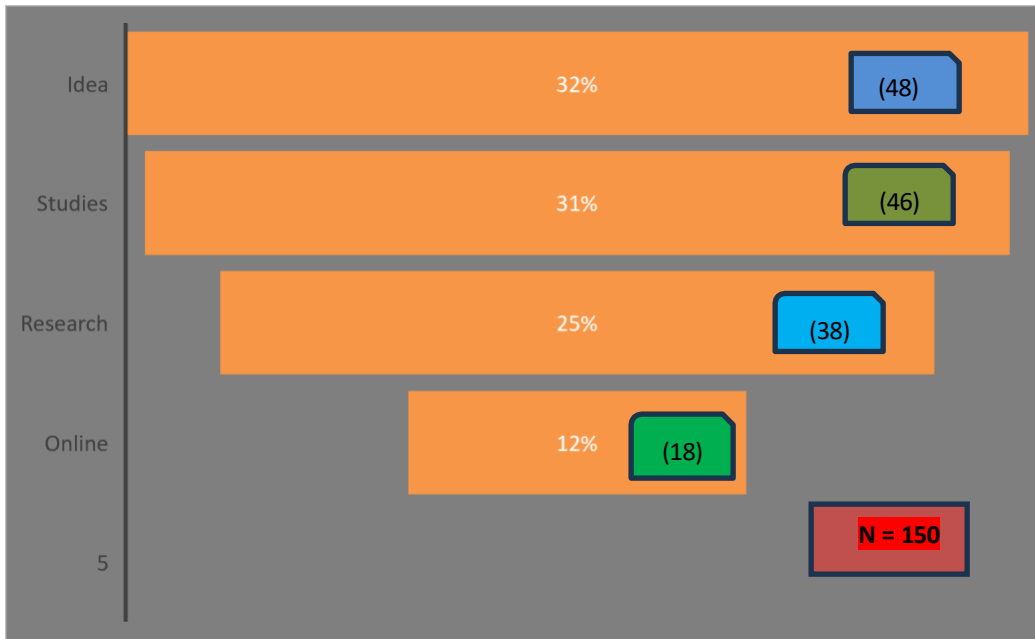


Figure 3.3 we found that 25.33% of students used ChatGPT for research purposes, 12% used it for online tutoring, 30.66% used it for their studies, and 32% used it for idea generation.

3.5 Distribution the Sample Based on the Strengths of ChatGPT in Supporting Academic Work

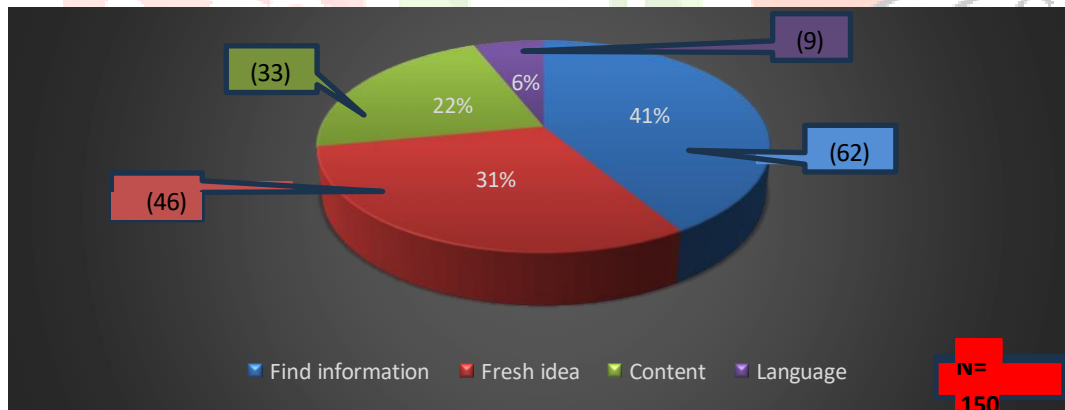


Figure .3.4 shows that 41.33% of students considered ChatGPT as a strength for finding information, 30.66% of students for creating fresh ideas, 22% of students for content generation, and 6% of students for language translation.

3.6 Distribution the sample based on the Use of ChatGPT for Brainstorming Ideas and Generating Content for Research and Academic Work.

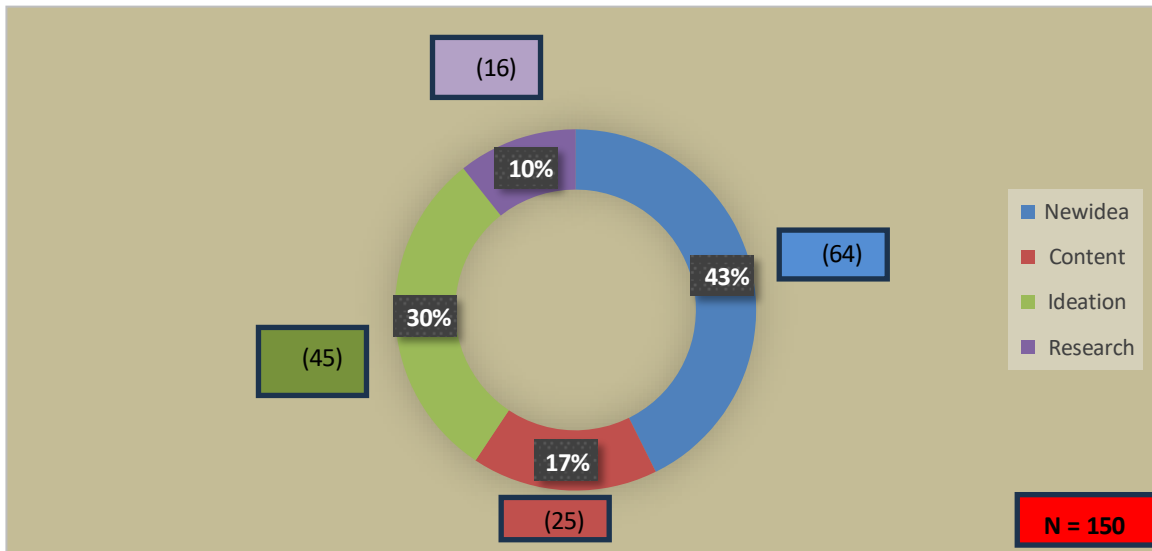
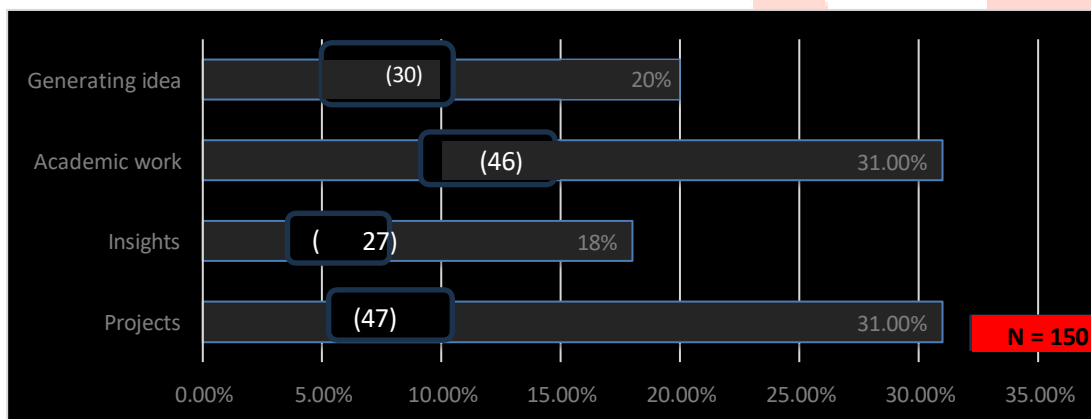


Figure 3.5 shows that 43% of students used ChatGPT for brainstorming and developing new ideas, 17% used it for content creation, 30% used it for academic ideation, and 10% used it for research content.

3.7 Distribution the Sample Based on Collaboration with Peers or Colleagues While Using ChatGPT for Academic Tasks.



Academic Tasks.

Figure 3.6, shows that 31% of students used ChatGPT in collaboration with peers or colleagues for projects, 18% used it for sharing insights, 31% used it for editing academic work, and 20% used it for generating ideas with peers.

3.8 Distribution the sample based on Recommendation of ChatGPT further to other students.

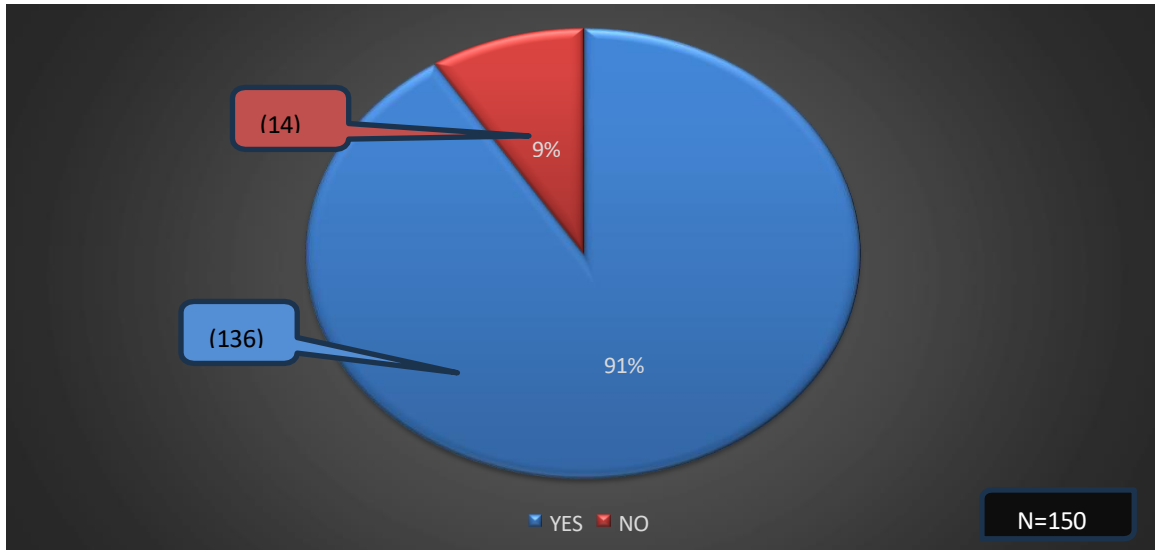


Figure 3.7, shows that 9% of students said no to ChatGPT's recommendations, and 91% of students said yes.

3.9 Compare the divergent production abilities of ChatGPT users based on various demographic profiles.

Age

	No.	Mean	S.D.	t/p	
21-25	114	67.79	15.51	0.46	NS
25-35	36	70	17.56		

Table no.3.6 shows that there was no significant difference between the 21-25 and 25-35 age groups because both equally use ChatGPT for divergent production abilities.

Gender

	No.	Mean	S.D.	t/p	
M	46	67.39	15.18	0.48	NS
F	104	68.74	16.40		

Table no.3.7 shows that there was no significant difference between the Males and females because both equally use ChatGPT for divergent production abilities.

Stream

	No.	Mean	S.D.	t/p			
Arts	42	68.04	16.83	-----	0.27	0.17	0.55
Science	44	67.15	18.52	NS	-----	0.40	0.78
Commerce	31	68.74	11.60	NS	NS	-----	0.32
Technical	33	69.84	15.37	NS	NS	NS	-----

Table no.3.8 shows that there was no significant difference between males and females because all streams equally use ChatGPT for divergent production abilities.

Study level

	No.	Mean	S.D.	t/p	
Masters	120	66.63	14.65	2.58	S at (0.01)
Research Scholars	30	75.1	19.35		

Table no.3.9 shows that there was a significant difference between the Masters and Research scholars of the university on 0.01 level because it was found that research scholars, when using Chat GPT, exhibited a higher degree of divergent thinking compared to masters.

Universities

	No.	Mean	S.D.	t/p		
				DEI	DBARU	J.S.
DEI	50	71.76	15.45	-----	2.26	1.08
DBARU	50	65.04	14.29	S at (0.05)	-----	0.98
J.S.	50	68.18	17.65	NS	NS	-----

Table no.3.10 shows that there was a significant difference between the DEI and DBARU university on 0.05 level because it was found that DBARU students when using ChatGPT, exhibited a higher degree of divergent thinking compared to DEI students. But there was no significant difference between DEI and J.S. university or DBARU and J.S. university because both equally use ChatGPT for divergent production abilities.

Enrolment

	No.	Mean	S.D.	t/p	
Regular	147	67.93	15.91	1.72	NS
Part-time	3	87.33	4.50		

Table no. 3.11 shows that there was no significant difference between Regular and Part-time enrolment because both equally use ChatGPT for divergent production abilities. Those students who are enroll part-time they are using ChatGPT more than regular students.

Family type

	No.	Mean	S.D.	t/p	
Nuclear	69	70.26	15.51	1.86	NS
Joint/Extended	81	66.67	16.31		

Table no.3. 12 shows that there was no significant difference between the Nuclear and Joint/Extended family types because both equally use ChatGPT for divergent production abilities.

Occupation–M

		No.	Mean	S.D.	t/p		
					Business	Service	Unemployed
Business	56	69.35	16.89	-----	0.88	1.29	
Service	78	66.78	15.68	NS	-----	0.21	
Unemployed	13	73.38	13.11	NS	NS	-----	

Table no. 3. 13 shows that there was no significant difference between the Business, Service and Unemployed occupations of males all equally used ChatGPT for divergent production abilities.

Occupation-F

	NO.	Mean	S.D.	t/p		
				Business	Service	Unemployed
Business	6	84	20.33	-----	1.43	2.02
Service	29	70.10	14.17	NS	-----	1.01
Unemployed	115	67.06	15.86	S at (0.05)	NS	-----

Tableno.3.14. shows that there was no significant difference between the Business and service occupation or Service and Unemployed occupations of females all equally use ChatGPT for divergent production abilities. But there was a significant difference between the Business and Unemployed occupation on 0.05 level.

3.10 Study the effect of ChatGPT use on their divergent production abilities.

Hours	No.	Mean	S.D.	t/p			
				1.5 h	2.5 h	3.5 h	4.5 h
1.5 h	105	67.54	15.41	-----	1.03	1.19	2.07
2.5 h	33	71.06	17.71	NS	-----	0.27	1.69
3.5 h	10	72.4	12	NS	S at (0.05)	-----	1.53
4.5 h	2	89.5	14.84	NS	NS	NS	-----

Table no 3.15 shows that using ChatGPT for 1.5 hours, 2.5 hours, and 3.5 hours there was no significant difference in students divergent thinking. However, a significant difference on 0.05 level it was observed between students who used ChatGPT for 1.5 hours and those who used it for 4.5 hours. This difference was attributed to the fact that students who used ChatGPT for 4.5 hours exhibited higher levels of divergent thinking compared to those who used it for 1.5 hours.

4. Findings and Conclusion

- 75% of adults belong to 21-25 years of age students and 25% of adults belong to 25-35 years of age.
- The majority of 31% of adults belonged to males and 69% of adults belonging to female students were included in the sample
- 4 streams of universities are 28% of Arts, 29% of science, 21% of commerce, and 22% of technical.
- Levels of study 80% of P.G. students and 20% of Research Scholars.
- 33.33% of DEI, 33.33% of DBARU and 33.33% of J.S. universities.

- There was a significant difference between the 21 to 25 and 25 to 35 years age groups of university students on 0.05 level because students in the 25 to 35 years age group use ChatGPT more than students in the 21 to 25 age group because individuals aged 25 to 35 are usually engaged in research-related work, whereas those in the 21 to 25 age group often have tasks that primarily involve working with related to study text only. This is why they may have less time to dedicate to ChatGPT according to duration.
- 32.66% of students learned about ChatGPT through their friends, 6.66% through tech blogs, 30% through YouTube videos, 6.66% through their seniors, 4% through their professors, and 20% through news articles.
- 9.33% of students have been using ChatGPT for a few weeks, 36.66% for less than 6 months, 10% for a period between 6 months and 1 year, and 4% have been using it for over 1 year.
- 25.33% of students used ChatGPT for research purposes, 12% used it for online tutoring, 30.66% used it for their studies, and 32% used it for idea generation.
- 41.33% of students considered ChatGPT as a strength for finding information, 30.66% of students for creating fresh ideas, 22% of students for content generation, and 6% of students for language translation.
- 43% of students used ChatGPT for brainstorming and developing new ideas, 17% used it for content creation, 30% used it for academic ideation, and 10% used it for research content.
- 31% of students used ChatGPT in collaboration with peers or colleagues for projects, 18% used it for sharing insights, 31% used it for editing academic work, and 20% used it for generating ideas with peers.
- 9% of students said no to ChatGPT's recommendations, and 91% of students said yes.
- There was a significant difference between the Masters and Research scholars of the university on level because it was found that research scholars when using ChatGPT, exhibited a higher degree of divergent thinking compared to masters.
- There was a significant difference between the DEI and DBARU university on 0.05 level because it was found that DBARU students when using ChatGPT, exhibited a higher degree of divergent thinking compared to DEI students. However, there was no significant difference between DEI and
- J.S. University or DBARU and J.S. University because both equally use ChatGPT for divergent production abilities.
- There was a significant difference between the Business and Unemployed occupation on 0.05 level. hours, 2.5 hours, and 3.5 hours there was no significant difference in students' divergent thinking. However, a significant difference on the 0.05 level it was observed between students who used ChatGPT for 1.5 hours and those who used it for 4.5 hours. This difference was attributed to the fact that students who used ChatGPT for 4.5 hours exhibited higher levels of divergent thinking compared to those who used it for 1.5 hours.

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