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ChatGPT as a Cognitive Tool: A Study on Transformations in Indian Higher Educational Pedagogies

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ABSTRACT
Artificial Intelligence based ChatGPT has taken the higher education ecosystem by a storm, forcing are-think on the current teaching pedagogy.
A state of uncertainty has gripped the teaching community as efforts are on to mitigate the impact of ChatGPT on education at universities.
This research paper does a deep dive into how ChatGPT is likely to irrevocably change how students learn and teachers teach.
In a two-week class-room based experiment in our discussion-based News Analysis classes as well as lecture-based Marketing classes, we divided students into two equal groups. One group was allowed to use ChatGPT, while the other one was a control group. The ChatGPT group granted access once to use ChatGPT to find answers to tricky terms/queries, while the control group had no such AI-tool access.
After the two-week period got over, it was found that the ChatGPT students had a steeper learning curve as compared to the control group.
This research paper argues that ChatGPT can be effectively put to use in classroom-based teaching.
It is a human-computer hybrid model in which this AI tool assists in regular teaching.

Keywords: ChatGPT, Artificial Intelligence, Teaching, Education

Introduction

Education has been rapidly evolving over the years, with the transition process being hastened with the advent of technology. The last 100 years in education can be broadly categorized under the three C's: Chalk, Click and now ChatGPT. The period of chalk on slate was preceded by centuries of oral learning. The period of click refers to computerization, which changed the teaching pedagogy. The latest period is marked by ChatGPT which is practically redefining the educational process.

Shift from traditional to digital education

The last 100 years has seen a clear and distinct transition in education. Traditional system ofeducation involved students listening to the lectures from teachers who used to write on blackboards with chalk.

This was prevalent India and across South Asia. The students were expected to memorize the lessons and in the traditional system, the pen and paper test was used to evaluate the students. All this was before computerization happened in the 1990s.

AI and Digital Education

While artificial intelligence has pushed the frontiers of education, it has also marked a shift from the computerization process in schools and higher education institutions. In the beginning of this period, computers and other hi-tech gadgets were seen as an educational tool, but now artificial intelligence is becoming an intrinsic part of the teaching-learning pedagogy.

Softwares generated through artificial intelligence have the capacity to further transform the way we learn. A good example of such a software is Duolingo.
This period began with click and learn, which saw computers and other electronic devices rapidly finding their ways into classrooms and enhancing the learning process for students.

ChatGPT and Education

Artificial Intelligence-based ChatGPT has left teachers worried as it is considered to be a tool that can be misused by the students to complete their assignments in a jiffy.

Even examinations too can be cracked by the ChatGPT which is growing smarter by the day as it dredges the vast online resource to quickly learn and then produce responses in a conversational style.

It is critical to integrate AI, including ChatGPT, in domain learning tasks as it shows how humans are solving real-world problems.

ChatGPT has practically obfuscated the teaching-learning pedagogy and it is being incessantly argued that ChatGPT is turning out to be a hinderance in education, for universities and schools alike.

The AI-powered chatbot, the Beta version of which was released in November 2022, triggered a row over its use in educational institutions as it was strongly felt that the tool will lead to plagiarism and greatly hinder learning.

However, there is a silver lining in the dust haze that has been raised by the arrival of OpenAi's ChatGPT as it can be considered a teaching tool in classrooms.

Instead of seeing this new disruptive technology as a bane for education, it would perhaps be better to have a two-pronged approach to deal with the impact.

The first is to see how classroom learning can be made better through ChatGPT. This can be done by using ChatGPT as a teaching assistant. The teacher at an educational institution can explain a concept threadbare and then ask the students to turn to ChatGPT to summarise the lecture.

This would immediately help the students to have a comprehensive understanding of what has been taught in the class. ChatGPT will be beneficial for those classrooms were discussion-based learning takes place. For instance, in the News Analysis class where a particular news item is closely examined, a query to ChatGPT will throw up a cogent response, adding to the body of students' knowledge.

The hypothesis that ChatGPT is a good teaching tool was put to test over a two-week period and the results showed that the students who had been provided access to ChatGPT learned better as compared to the control group which had not been given access to this AI-based tool.

ChatGPT can be particularly useful in India where the school dropout rate is quite high and a matter of concern for policy makers.

The Unified District Information System for Education Plus (UDISE+) report said that the dropout rate among primary students went up from 0.8 per cent in 2020-21 to 1.45 per cent in 2021-22. The rate for drop out for upper primary students shot up from 1.9 to 3.02 per cent. (The Print, 2022)

Early childhood education, out-of-school children and quality teaching and learning are the three programming areas that were prioritized by UNiCEF at the beginning of the country programme in 2018. (UNICEF, 2022)

ChatGPT can be particularly useful for out-of-school children as well as for providing high quality teaching and learning. For children who are not going to school for a variety of reasons, any device including a mobile phone can be used to download a few pre-decided questions of the day. The student just needs to type it out in the electronic device and reading that answer would keep the student up-to-date.

For high quality education, ChatGPT will be a useful tool. Once policy makers decide to incorporate ChatGPT into the education system, it will immediately provide uniformity to students across the country. In any subject in any part of India, if the academic question posed to ChatGPT is the same, then the response too will be the same. This will have the dual role of giving high quality education with uniformity.

The biggest concern across the world today is that ChatGPT will lead to a spike in cheating during examinations. The solution to that concern is the step taken by Australian educational institutions to go back to pen and paper test. (The Boar, 2023).
Not just Australian universities, New York City education department was one of the first in the world to bar the use of ChatGPT. (Chalkbeat, 2023)

However, in less than a month, there now seems to be a rethink by the New York school authorities over its decision to bar the use of ChatGPT.

NYC public school officials may announce a new policy on ChatGPT that could reverse a prior ban and be "much more accepting" of artificial intelligence in classrooms, New York City Department of Education Chancellor David Banks was quoted as saying. (New York Daily News, 2023)

"I don't necessarily see it for bad. I just see it as challenge. We can't run from it. We've got to get out in front of it. We've got to make sure we put the safeguards around it, and then have the maximum impact for good," Banks added.

This research paper buttresses the point that Banks made. Clearly, there is more to ChatGPT than just the accusation of it being a tool for plagiarism.

Juxtaposing the educational eco-system of a country like India with OpenAI's ChatGPT, it would be a possibility to see that this tool benefits those students who dropout for a host of reasons and also use it for teaching purposes in classrooms. Admittedly, in the present scenario, there is a likelihood of examinations being compromised due to this artificial intelligence-based tool. One partial solution would be to bar ChatGPT on the server of the educational institution. In the near future, one may be able to use Internet of Things (IoT) to counter the online menace of ChatGPT for cheating in exams.

The elephant in the room continues to be the fact that assignments to students may be greatly compromised as ChatGPT throws up responses that are seemingly passable in nature. The risk of cheating has now increased manifold.

One way to mitigate this risk would be to stop giving take-home assignments and ensuring that the students complete their assignments in the presence of the faculty members. This would increase the workload of teachers, but would ensure that cheating per se does not take place.

Also, it has to be borne in mind that if the same question is asked by different sets of people, the ChatGPT response is always nearly the same. A quick scan of the answer scripts would weed out those who have used ChatGPT to cheat. ChatGPT is here to stay. How we utilise it will make or mar the impact of this artificial intelligence-based tool in the education system.

Problem Statement

The western world is shunning the ChatGPT on the grounds that it is not only going to undermine academic integrity but will also increase cheating as well as plagiarism (Goodall, Jan 2023, https://theboar.org/2023/01/australian-universities-to-return-to-pen-and-paper-exams-after-student-ai-use/). It is also considered an obstacle to the sanctity of the teaching-learning process. However, like any other online platform, ChatGPT also has its own advantages. The research here tries to find out how ChatGPT can be used as an aid to the teaching-learning process. The paper also tries to determine its role and future in the digital education system and whether it has the capacity to create jobs like any other AI platform.

Research Questions

1. Can ChatGPT be used as a teaching tool?
2. What are the potential benefits of using ChatGPT in classroom teaching?
3. What are the risks associated with introducing ChatGPT in classroom teaching?
4. Will ChatGPT reconstruct the digital education system?
5. Should ChatGPT be taught as a tool considering that it may create future jobs in content writing?

Research Objectives

1. To understand how ChatGPT can be used as a teaching tool?
2. To understand the potential benefits and risks of using ChatGPT in classroom teaching?
3. To understand if ChatGPT can reconstruct digital education system and generate future employment?

Literature Review

Educators have to consider adjustments to the educational learning goals, learning tasks, and assessments and evaluations to better prepare future citizens due to the arrival of ChatGPT which is a Natural Language Processing-based tool. (Zhai, 2022) The researcher observed the responses from ChatGPT look professional, and the content is coherent and more or less accurate.

AI finds needed information efficiently as compared to a human being. It seems like educators need to revisit the requirements for literacy in education.

The AI tools writing demonstrates four characteristics: Coherent, (partially) accurate, informative, and systematic. For each query that is posed to the AI tool, its responses cover the key information and flow well between paragraphs. All this can be considered handy by educators.

ChatGPT is neither sentient nor does it have self-awareness. This artificial intelligence tool is very good at processing information, distilling it, and presenting it in a human like manner. AI, including ChatGPT, does have its limitations in its range and depth of knowledge. Forexample, it is not really familiar with hedge fund ownership of news media) as well as its lack of capacity to think (or appear to) critically or creatively. ChatGPT has a significant level and range of knowledge of journalism and media. (Pavlik, 2023) ChatGPT, which is a vastly improved natural language processing model, has the ability education across various disciplines. In medical question answering, ChatGPT is comparable to a third year medical student and this AI tool has the ability to provide reasoning and informational context across the majority of answers. These facts make it a compelling case for the potential applications of ChatGPT as a medical education tool. (Gilson et. al, 2022) Application of generative artificial intelligence, including ChatGPT, can be considered in the field of engineering education, which in any case is constantly evolving to keep up with the latest technological developments. (Qadir, 2022) The researcher noted that ChatGPT should be in a position to offer personalized and effective learning experiences by providing students with customized feedback and explanations, as well as creating realistic virtual simulations for hands-on learning. There are limitations of this technology as ChatGPT and other generative AI tools are only as good as their training data and may perpetuate biases or even generate and spread misinformation.

To mitigate the misuse of ChatGPT by students, university authorities can re-design their assessment. Assessments can be created that require students to demonstrate their critical thinking, problem-solving, and communication skills. The assessments should require students to engage in group discussions, presentations, or other interactive activities that involve the application of their knowledge and skills. (Cotton et. al, 2023) When it comes to education, ChatGPT may look like a perfect teaching assistant, but there are limitations.

ChatGPT may produce seemingly credible but incorrect responses, such as inventing terms that it needs to be familiar with. This phenomenon is called hallucination effect. Also, ChatGPT faithfully follows instructions rather than engage in genuine interaction. For example, when the information provided to it is not enough, ChatGPT tends to make assumptions about what the user wants to hear rather than asking clarifying questions. (Shen et. al, 2023) For the students of finance, ChatGPT offers an opportunity to use it for carrying out further research.

AI chatbot ChatGPT can significantly assist with finance research. In principle, these results should be generalisable across research domains. There are clear advantages for idea generation and data identification. (Dowling & Lucey, 2023) The reason ChatGPT-3 can be considered an effective tool for teaching and learning is because it has the ability to understand and respond to complex prompts. This AI tool can help students understand and summarize difficult texts, and can also generate prompts for writing assignments. (Aljanabi, 2023)

The researchers stress that ChatGPT must be used as a tool to assist with academic writing, rather than to replace it. This AI tool can generate summaries of papers, extract key points, and even provide citations. This can save researchers a significant amount of time and effort, allowing them to focus on more important tasks such as analysis and interpretation. AI technologies like chatbots can be tailored to provide interactive help to students, which can improve the learning experience and boost student participation in online courses.

ChatGPT, by offering individualized and interactive help, can encourage the independence and independent study of autodidactic learners. (Firat, 2023) While the primary focus of educators has been on the use and impact of ChatGPT on education, the decolonialization of higher education needs to be borne in mind.

The decolonial ethical frameworks for artificial intelligence in higher education is critical or else new technologies will reproduce the racialised and colonial formations of the past. Commonplace higher education processes can indicate ways in which students and instructors can proactively become involved in data activism, for instance, repurposing data analytics and reconfiguring the ways in which students are positioned and seen through learning analytics. (Williamson, 2023) It needs to be kept in mind that Chatbots do provide an opportunity to finish tasks quickly.

PhD dissertation finalization and quick literature review for their grant proposals are some of the areas where it can be used. (van Dis et al., 2023) The researchers argued that freeing academics up to focus on new experimental designs can be done with the help of AI chatbots. This could significantly accelerate innovation and potentially lead to breakthroughs across many

disciplines. We think this technology has enormous potential. A note of caution was struck by the researchers who opined that it was important to examine and advance the validity and reliability of large language models so that researchers know how to use the technology judiciously for specific research practices.

Digital Education

It would not be out of context to mention that learning technologies evolution is in direct correlation to the evolution of technologies. The process of computerization has opened up new spaces and communities are keen to explore them so that new opportunities can be found to support education. Even though the technology driven education has received its fair share of criticism, but the reality is that computer science is evolving much faster than education. (Dillenbourg, 2016). Paper based instruments comprise analogue technologies that are utilized for data gathering.But, digital technologies are created with software, hardware and information systems. Digital technologies provide software layer that accelerates the temporalities of data collection, calculation and communication.

Computerised processes, including software, enables educational data to flow throughout the system through the coded infrastructures of communication networks, to be entered into vast databases, to encounter analytics packages, and to be transformed into new kinds of graphical display and visualization. (Williamson, 2016)

Leading researcher Williamson B goes on to say in another research paper that the influence of digital technologies is complementing existing uses of data. It is being complemented with methods of digital education governance, whereby digital technologies, software packages and their underlying standards, code and algorithmic procedures are increasingly being inserted into the administrative infrastructure of education systems. (Williamson, 2016) Clearly, technology has its benefits as far as education is concerned.

It has been demonstrated how technology can be used effectively to support learning. To be useful in practice, it needs to address the contexts within which the technology is used; and it needs to be presented in ways that are accessible to industry, teachers and learners. (Luckin et al., 2012)

The researchers found potential to make better use of technologies that are widely available, but they added that to realise this potential, innovative teaching practice is needed. Teachers may require additional training that enables them to use technologies in new ways. There are lessons to be learnt from how technology has had a salutary effect on education in the past and this is exactly the point that this research paper makes with regard to the latest technology ChatGPT. An interesting aside is that digital education is strongly influenced by visions of the future put forward by a range of stakeholders. Resultantly, teachers must respond to the highs and lows of the hype cycle and often must defend their practices and matters of concern against a relentless orientation to the ‘next big thing’. More importantly, the educationists need to keep in mind whether of the transformative power of a digital platform or of the dehumanising danger of whatever the kids are into these days. (Ross, 2017)

In fact, researchers have expressed their scepticism about the possibility of developing a radical digital citizenship in digital education. The politics of digital education are constrained by priorities in digital education like developing online undergraduate, postgraduate programmes and massive online open courses (MOOCs), learning analytics and analysing digital identities in online spaces. (Emejulu & McGregor, 2019) The researchers are of the view that the struggles over the shape, delivery, cost and accessibility of higher education is between faculty, students, universities and private sector organizations. They argue that the questions about digital education must always be put in a wider context of the struggles of power as embodied in digital technologies. Referring to the notion that digital technologies enable a complete break from materiality restrictions, a researcher described it as a pervasive trope in educational technology. Digital technology allows us to connect instantaneously with others across large distances. (Gourlay, 2021) Artificial Intelligence has increasingly been playing an important role in education. From computer and computer related technologies, artificial intelligence transformed to web- based and online intelligent education systems, and AI finally shifted to embedded computer systems. With other technologies, it is now shifting to humanoid robots and web-based chatbots to perform instructors’ duties and functions independently or with instructors. (Chen et al., 2020) The researchers pointed out that the quality of learning improved as the systems leveraged machine learning and adaptability leading to curriculum and content being customized and personalized in line with students needs. The US and Australia have made a good start by trying to add artificial intelligence as a subject in the curriculum. Bringing together an AI expert and educators may well be a solution. The US has established a joint working group—the Association for the Advancement of Artificial Intelligence (AAAI) and the Computer Science Teachers Associate (CSTA)—to develop national guidelines to teach school students AI. (Kim & Park, 2017) Australia too is trying to teach AI at the kindergarten and primary level. A senior artificial intelligence researcher was paired with K-6 teachers to deliver an AI course under the Sc ientists-in-Schools program. AI-based gaming can be useful for teaching as it can bring down the time and resource required to define problems, development of games, and benchmarking sets.

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Using Angry Birds AI competition platform for intensive programming course lookspromising. It includes strategic decision-making, time management, vision, and uncertainty handling problems. The students experienced the development of entries for the competition and the creation of game contents during the course. (Yoon & Kim, 2015)

Research Methodology

The research universe was defined and the sample was decided, based on the group that we intended to draw data from. The data that was collected from the respondents were interpreted and the analysis formed the base for the research. It was largely a mixed research methodology that leaned heavily on quantitative data. A software tool was used to turn that data into graphs for easier understanding of the outcome of the research that was conducted.

Data Analysis

Figure 1: Out of the total 240 respondents, 59.75 per cent were students from the field of media, 36.6 per cent were management students, a minimal 1.2 per cent were from liberal arts while 2.4 per cent were law students.

Fig 1

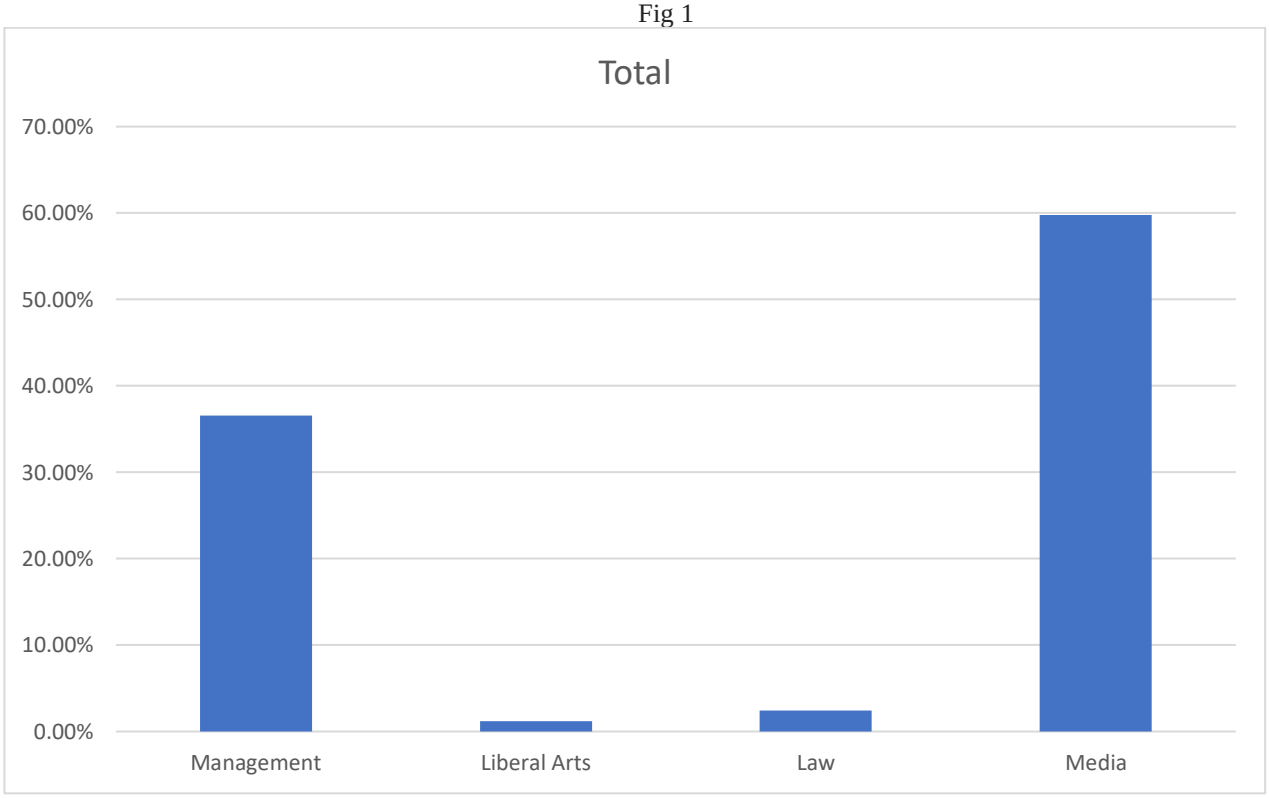

Figure 2: It was interesting to note that as many as 94 per cent students said that they are using ChatGPT. This also means that 6 per cent students are not using ChatGPT.

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Fig 2

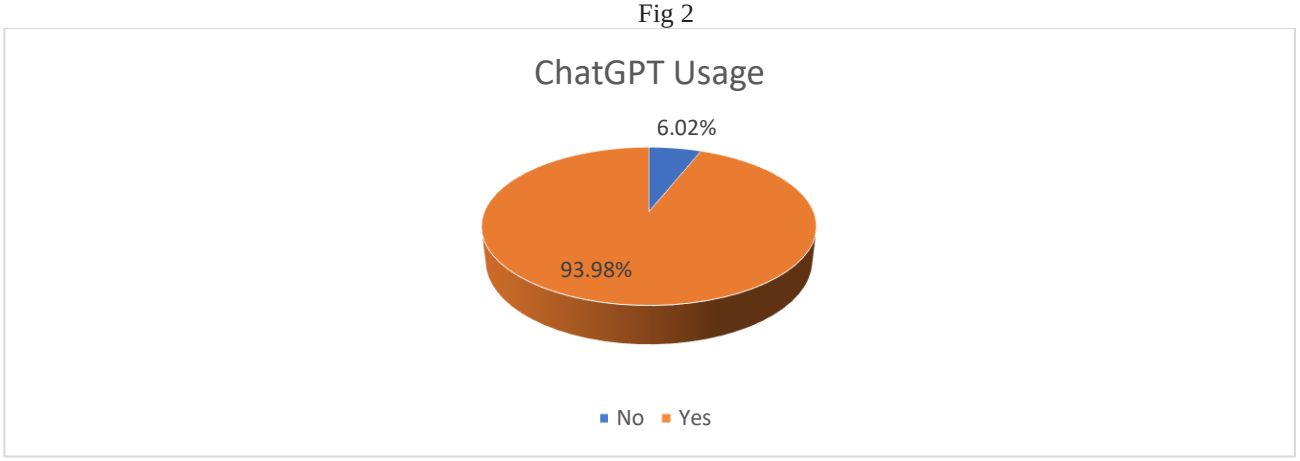

Figure 3: The advantage of ChatGPT was quite apparent. As many as 39.22 per cent of the management students said that they used ChatGPT for (all of the above) availability of notes, latest and updated information, and self- paced education. 3.92 per cent law students said all of the above while 50.98 per cent of media students said all of the above. The lowest was of 1.96 per cent from the liberal arts students.

Fig 3

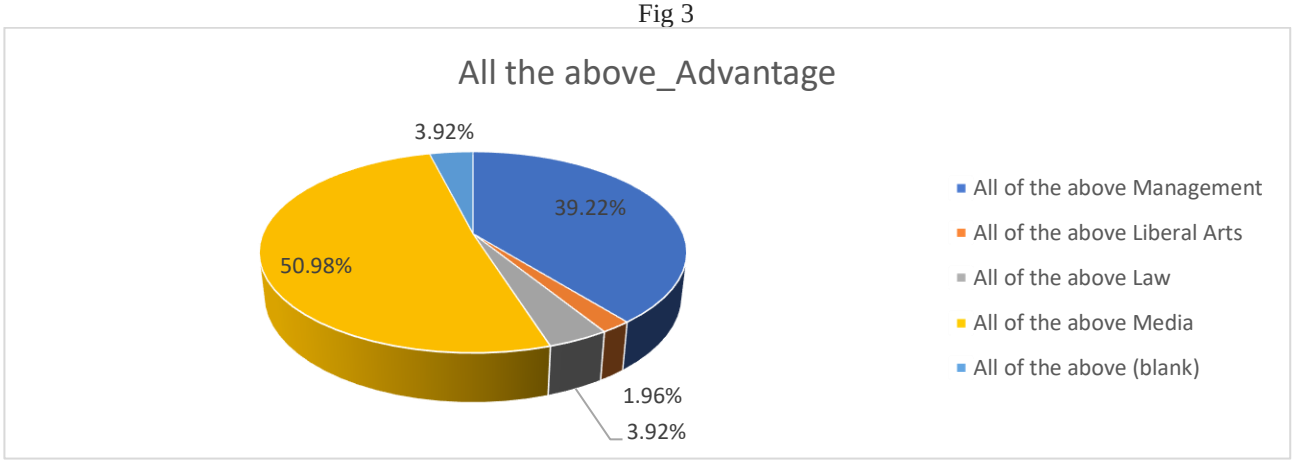

Figure 4: As far as availability of notes was concerned, a thumping majority of 85.71 per cent of media students said that ChatGPT helps in availability of notes. It was a rather low 14.29 per cent management students who said that ChatGPT helps in availability of notes.

Fig 4

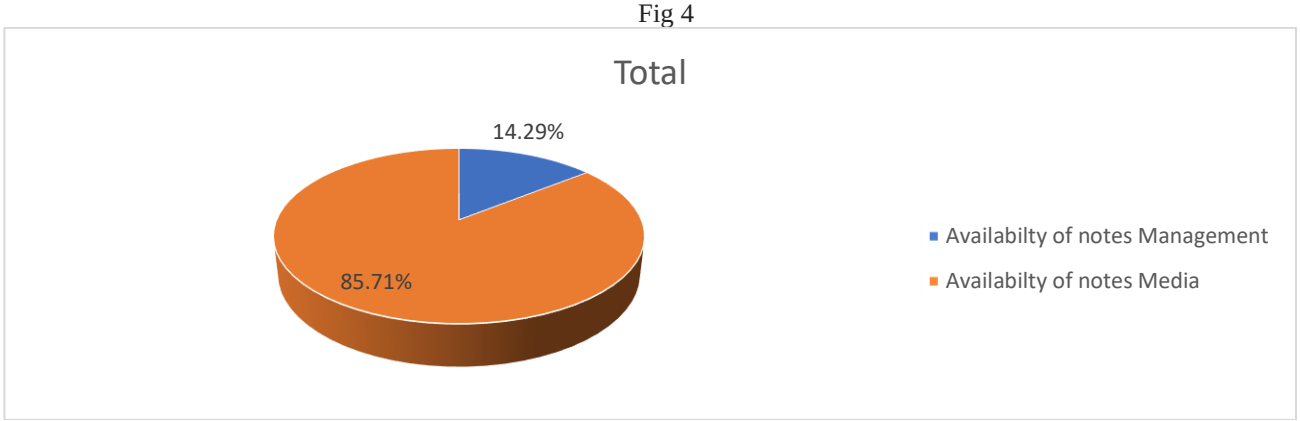

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Figure 5: Regarding the latest and updated information, 33.33 per cent of management students said that ChatGPT provides latest and updated information. As many as 55.56 per cent of media students said that ChatGPT provides latest and updated information.

Fig 5

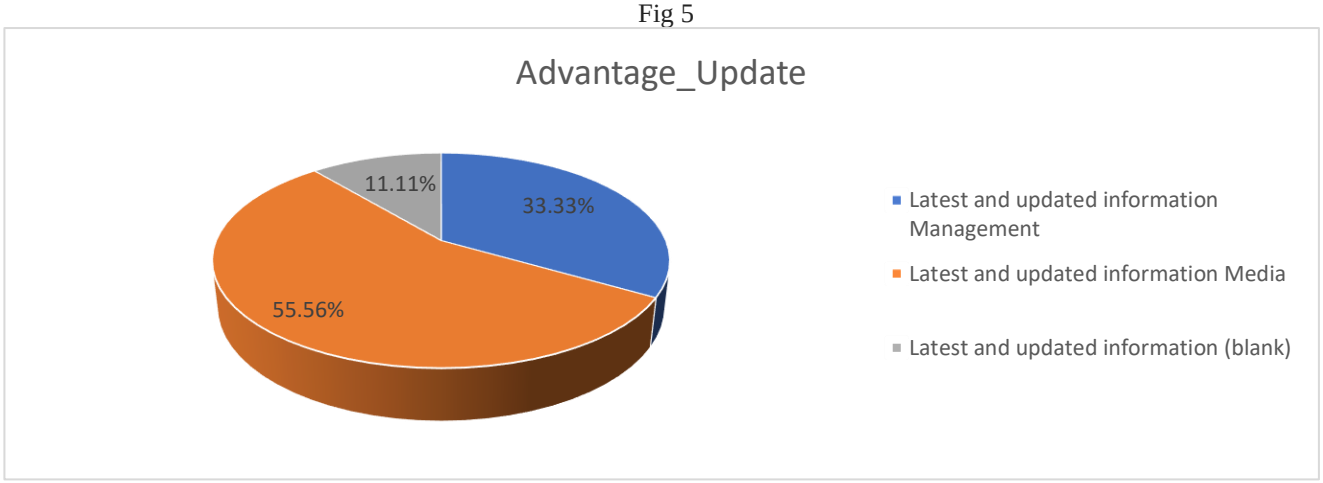

Figure 6: Self paced education – 28.57 per cent of management students said that ChatGPT helps in self paced education. 71.43 per cent of media students said that ChatGPT helps in self paced education.

Fig 5

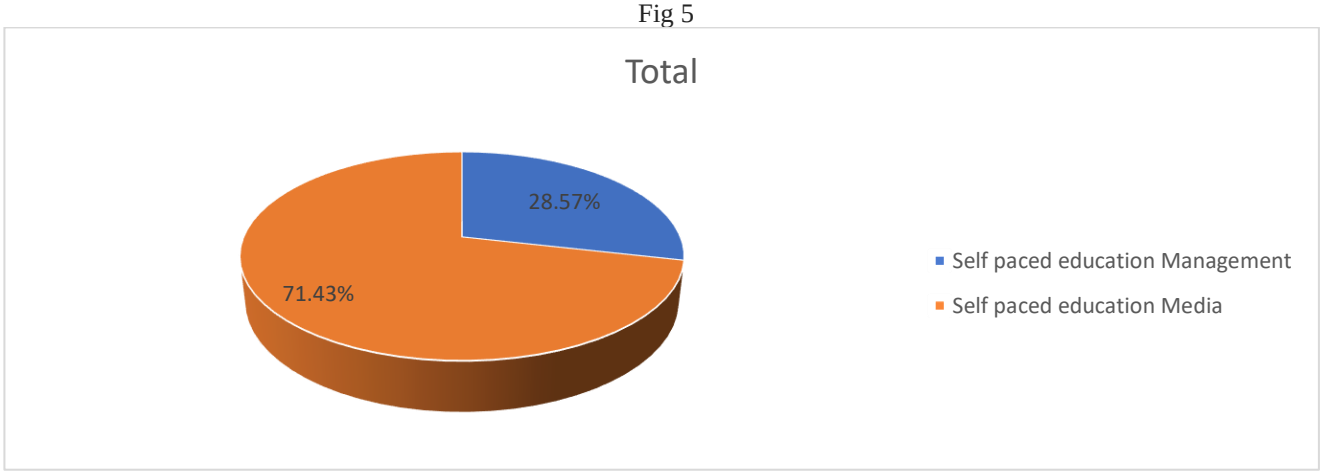

Figure 7: Risk associated with using ChatGPT – Cheating – 30.5 per cent of management students feel that ChatGPT will promote cheating. 63.15 per cent of media students felt that it will promote cheating. The rest are insignificant at 1.39 per cent for law and 2.08 per cent for liberal arts.

Fig 7

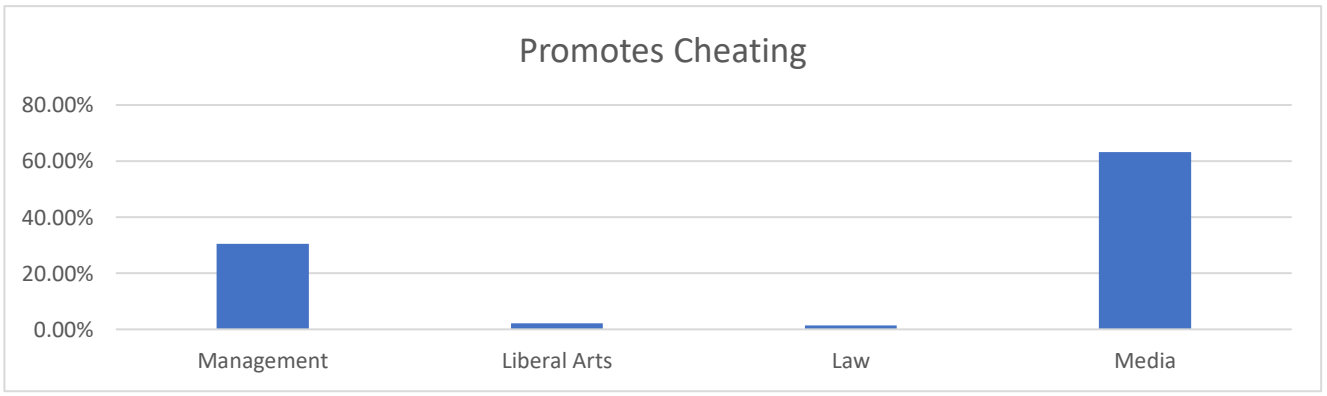

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Figure 8: Innovative thinking – 35.9 per cent of management students felt that it would promote thinking, while 60.4 per cent of the media students felt that it would promote thinking. 2.16 percent were law students and 1.44 per cent were liberal arts students.

Fig 8

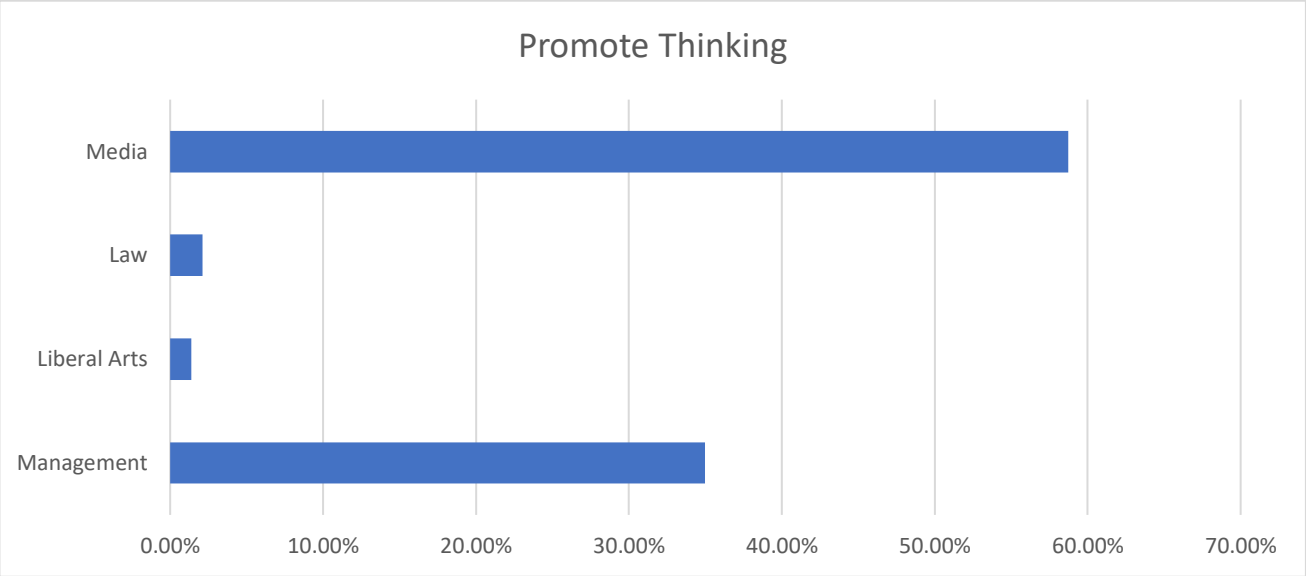

Figure 9: More than 60.28 per cent media student respondents accepted that ChatGPT will help in free education. 55.69 per cent media students believed in interdisciplinary research. 60.65 per cent media students – technology. 32.62 per cent management students for free education. 37.13 per cent for inter disciplinary and 32.26 management students for technology. Rest is below 5 per cent.

Fig 9

Row Labels	**Sum of Free_Education**	**Sum of Interdisciplinary**	**Sum of Technology**
Management	32.62%	37.13%	32.26%
Liberal Arts	1.42%	1.20%	1.29%
Law	1.42%	1.80%	1.94%
Media	60.28%	55.69%	60.65%
(blank)	4.26%	4.19%	3.87%
Grand Total	**100.00%**	**100.00%**	**100.00%**

Figure 10: Education redefining and Teaching Aid: 60 per cent media students are accepting education redefining. 57 per cent TA and reshaping. Management students 35 per cent for redefining, 36 percent for TA and 37 per cent for reshaping. Rest less than 2 per cent.

Fig 10

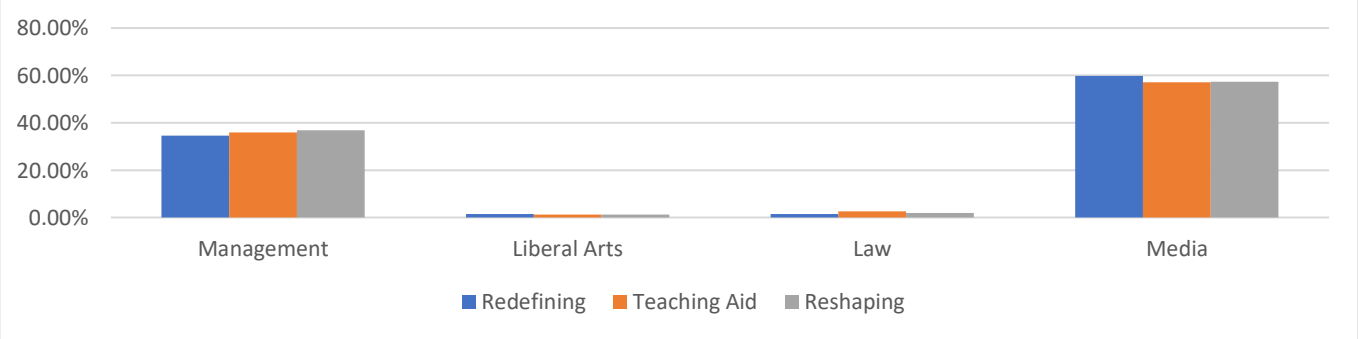

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Figure 11: For content (all students) the indication that 45 per cent of them were likely tap into it, while 19 per cent were highly likely. 31.3 per cent were neutral. There were just 3.6 per cent unlikely respondents, while a miniscule 1.2 per cent were highly unlikely respondents.

Fig 11

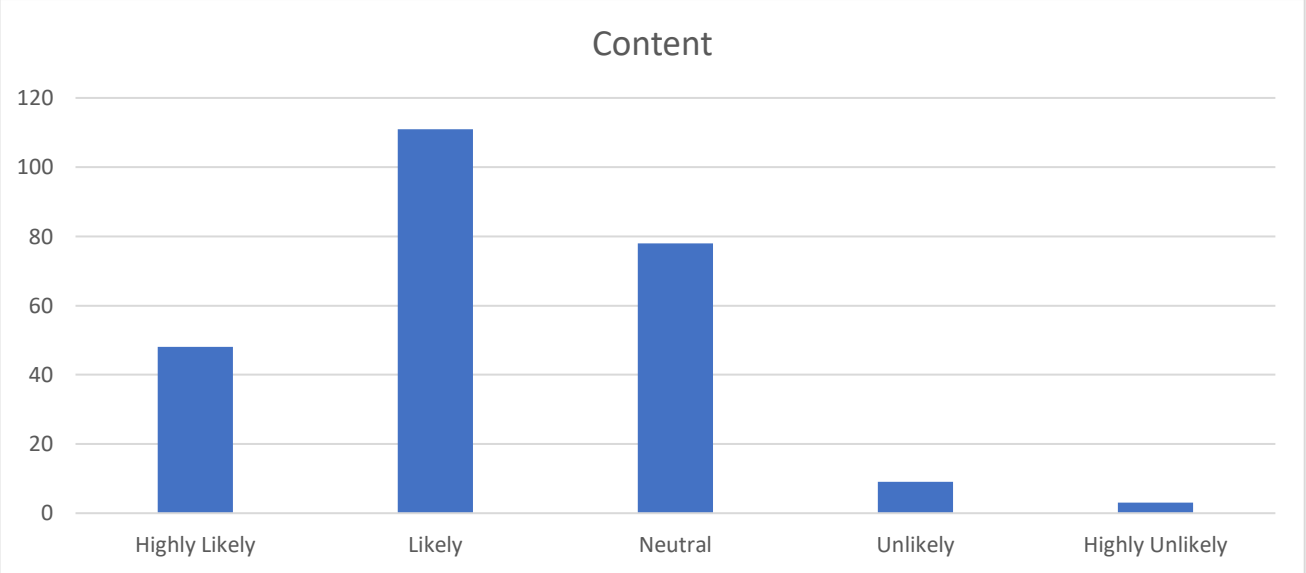

Figure 12: Teaching Aid: 41 per cent of the respondents are likely users, while 15 per cent are highly likely users. As many as 25 per cent are neutral towards its use as a teaching aid. At the other end, 17 per cent are unlikely to use it as a teaching aid while 2 per cent are highly unlikely users.

Fig 12

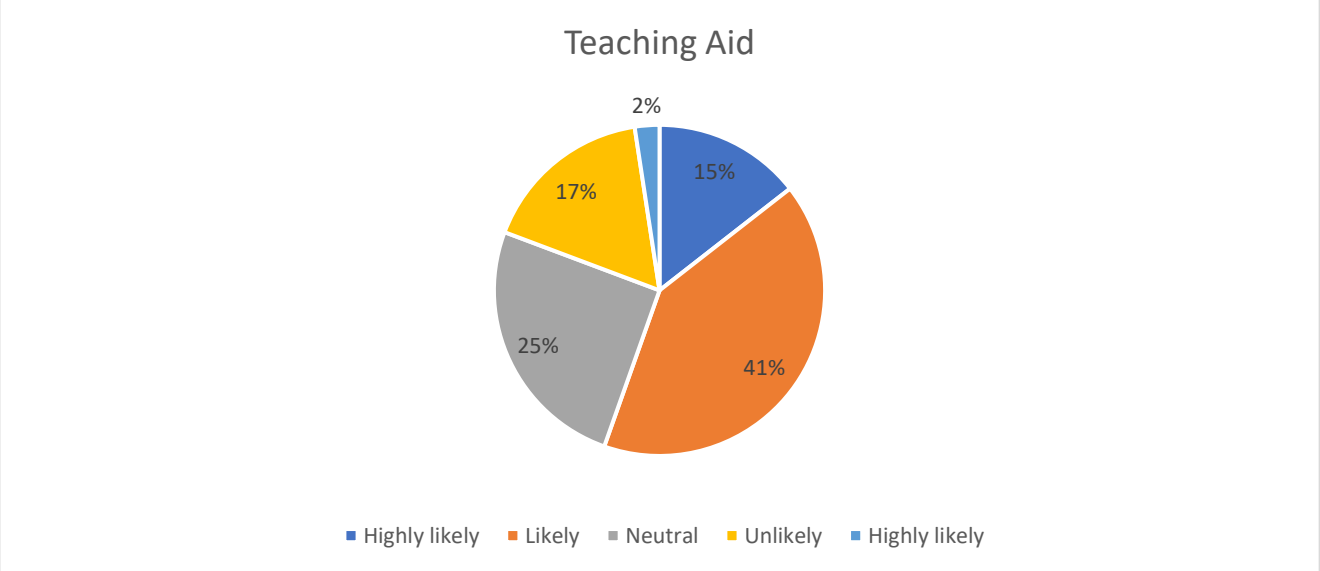

Figure 13: As far as research is concerned, 43 per cent are likely to use it, while 23 per cent are highly likely to use it. 17 per cent of the respondents were neutral. At the other end, 15 per cent were unlikely to use it for carrying out research. Two per cent of the respondents were highly unlikely to use it for undertaking research.

Fig 13

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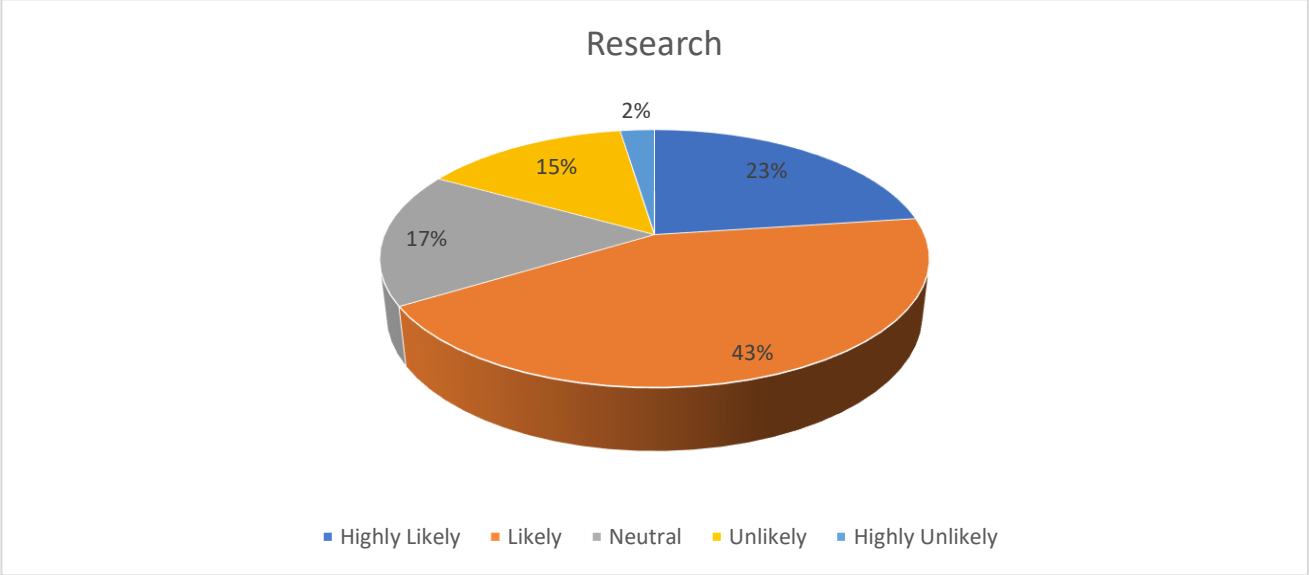
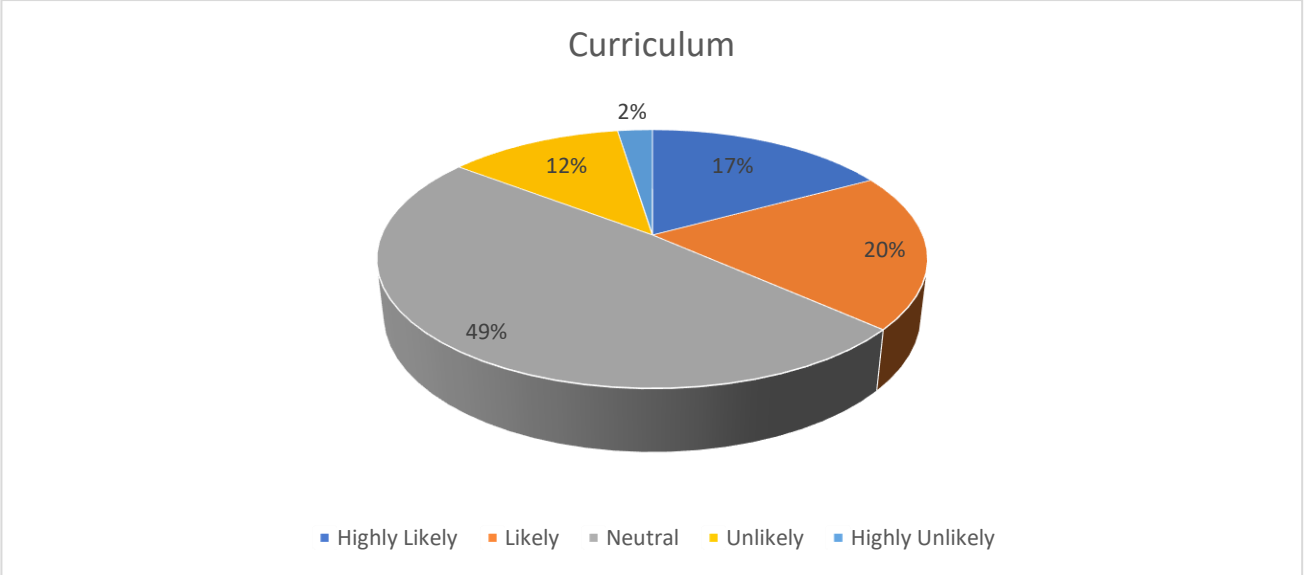


Figure 14: Curriculum forms the backbone of any educational institution. Among the respondents, as many as 49 per cent were neutral towards using it. However, the analysis of the responses indicated that 20 per cent were likely users and 17 per cent were highly likely users. It also showed that 12 per cent of the respondents were unlikely to use it, while 2 per cent were highly unlikely to use it.

Fig 14



Conclusion and Discussions

Our research has indicated that the students who use artificial intelligence driven Large Language Model, ChatGPT, are gaining more from it as compared to the control group. The students have also shown interest in using ChatGPT as a knowledge tool as it provides them with general information that they need. However, it must be stressed that the students also cross-check the information provided by ChatGPT to check its veracity.

The research throws up the option of harnessing the potential of ChatGPT as a learning tool for the benefit of the students from various streams, including media, management, law and liberal arts.

This also provides an opportunity to open up for academic discussion on how ChatGPT may be better utilised in the classrooms.

The data interpretation reveals an interesting facet that media and management students felt that their innovative thinking improved when they considered the output from ChatGPT. However, the law and liberal students did not consider this on the same lines.

The respondents of the survey indicated that cheating may take place to complete assignments. Most of the media students felt that cheating was possible, while a comparatively fewer management students took cheating into consideration. Liberal arts students were on the other end of the spectrum.

Limitations and Future Recommendations

One of the limitations, which can also be the scope for further study, was that only the students' perspective was taken into consideration. The other stakeholder, in this case the teachers, were not factored into this.

Since it's a Large Language Model, the output may not be very consistent to the requirement. The students had to cross-check the ChatGPT output to ensure that there were no inconsistencies.

Another limitation of this study was that the respondents were more from the field of media and management as compared to that of law and liberal arts. It must be highlighted that this kind of a study with a pan-country basis involving a much larger data set generated from various institutions of higher learning can be conducted.

Admittedly, innovative thinking may have improved with the usage of ChatGPT, but it needs to be included in policy implementation for the larger of students across the board. The implementation can be through inclusion in the teaching pedagogy, which in turn will lead to fostering economic growth from students whose creativity has been nurtured with the aided help of AI.

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