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Adoption ChatGPT in higher education settings: Potentials, challenges, and paving the way for future advancements

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Abstract: Several artificial intelligence generative language models have been developed recently. Many people in different contexts have started using them, such as education, industry, and even content creation. This study focuses on investigating how higher education students have been using ChatGPT as an example of a generative artificial intelligence tool. The context of the study was chosen due to the many voices against or in favor of using ChatGPT in higher education institutions. We deployed a mixed method to collect and analyze the data, including open-ended and closed-ended question surveys, to investigate the motivations and future expectations of students who have been using the ChatGPT tool. The research methodology comprises two main components: the initial phase involves conducting statistical analyses on questions about each of the 15 adoption factors. Responses concerning each factor were meticulously compiled and transferred into an Excel spreadsheet. Subsequently, the frequency of responses for each choice was tallied to discern prevailing trends and preferences among respondents. The second phase focuses on analyzing the open-ended questions' responses that forecast the future of ChatGPT as perceived by the participants. The data gathered from open-ended questions was analyzed thematically using Miles and Huberman's approach. Our findings reveal that students generally find using ChatGPT to be a helpful tool in their higher education institutions. The findings show that ease of use, perceived value, trialability, observability, relative advantage, social impact, and network effect are the most important factors behind their adoption decision. The findings also revealed that a significant number of students are still confused about ethical concerns and report the need for regulations when using ChatGPT. These findings are important for educators, policymakers, and technology designers who want to make the most of generative AI in education. Future research, however, is yet to be conducted to understand its ethical implications, long-term effects, and how to best incorporate it into teaching practices.

Keywords: *Adoption, Challenges, ChatGPT, Generative Artificial Intelligence, Higher education.*

1. Introduction

Technological advancements, including artificial intelligence (AI), have led to rapid changes in educational processes in the 21st century [1, 2]. AI has sparked with the development of generative AI tools such as Gemini, DeepSeek, and ChatGPT [3]. Accordingly, many firms have started or are trying to adopt ChatGPT in their operations [4]. For example, Microsoft has included ChatGPT in its Bing search engine, resulting in improved results and user experience [5]. The adoption of new technologies, including cutting-edge advancements like generative AI, often has a range of advantages as well as raising a set of concerns [6].

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Over the past two years, there has been a surge in research on generative AI, reflecting its growing relevance and impact across various fields. However, a significant gap remains in understanding the nuanced insights and specific factors influencing the adoption or rejection of these tools, particularly in the context of higher education [7]. While many studies have focused on evaluating adoption intentions, they have primarily relied on established models or theories, such as the technology acceptance model (TAM) [8]. These models provide a foundational understanding of adoption behavior by examining factors like perceived usefulness and ease of use. Yet, they often fall short of capturing the broader, context-specific considerations that shape decisions in higher education, such as ethical concerns, pedagogical alignment, institutional policies, and individual attitudes toward technology [9]. Addressing this gap requires more in-depth exploration to uncover the drivers, barriers, and implications of generative AI adoption in educational environments.

Accordingly, this study is motivated by the sparking ChatGPT to investigate why and how individuals accept such technology through a thorough empirical examination of real users [10]. The significance of this research lies in its standing as one of the pioneering endeavors in exploring this particular context, which investigates many motivational adoption factors [11]. Furthermore, the focus of the study is on the higher education's students since higher education institutes represent a monarchy deeply influenced by the evolution of such technology [9]. By examining the experiences and perspectives of students within this higher education setting, we aim to understand their motivations for adopting ChatGPT and discover the impact of this technology on academic environments, as well as the unique challenges and opportunities it presents [8]. Accordingly, the study focuses on answering the following research questions:

RQ1: What motivates higher education students to adopt ChatGPT in higher education settings?

RQ2: What challenges and future trends arise in the use of ChatGPT within higher education settings?

This paper contributes to both research and academia as follows: First, it provides a thorough understanding of student behavior while using a generative AI tool. This adds to the current corpus of literature about user motivations, preferences, and concerns. Moreover, it provides practical insights to industry stakeholders by identifying user habits, which assist those stakeholders in the creation of user-centric features. Second, it extracts and analyzes the concerns that students face while using ChatGPT, which provides a clear understanding of potential issues and areas for future development. As a result, it provides clear directions to generative AI tool designers to solve users' concerns, update their products, and improve users' convenience. Third, the study identifies several future trends in the use of generative AI in higher education settings, which gives directions for future research in the context of generative AI. Finally, this study provides an evaluation of both the positive and negative edges of the ChatGPT tool in higher education settings, which may help in shaping educational practices.

The rest of this paper is organized as follows: Section 2 provides background on generative AI and technology adoption factors. Section 3 discusses the methodology used in this research. Section 4 discusses the answers RQ1 and RQ2. Section 5 answers RQ3. Section 6 discusses the implications, limitations, and future research directions. Section 7 concludes this paper.

2. Background and Related Literature

2.1. Generative Artificial Intelligence

Generative AI is a branch of AI that focuses on machines' ability to generate new and original content autonomously [4]. Unlike traditional AI systems that follow pre-programmed rules, generative AI possesses the capability to create novel outputs by learning from existing data patterns. At the core of generative AI is the concept of generative models, which are algorithms designed to generate data that is similar to, but not a replica of, the input data they were trained on [12]. Generative AI operates through various models, with one prominent type being generative adversarial networks (GANs) [2]. GANs are composed of two neural networks: the discriminator, which compares the created data to actual data, and the generator, which generates data. These networks operate in a continual feedback

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loop, with the generator attempting to produce more realistic outputs and the discriminator improving its capacity to discern between actual and created data. Other models, such as vibrational autoencoders (VAEs), focus on learning the fundamental structure of the input data [13].

Generative AI has a wide range of applications. In natural language processing, models such as OpenAI's generative pre-trained transformer (GPT) have exhibited outstanding skills in creating coherent and contextually relevant text [13]. Moreover, StyleGAN has been used to generate realistic pictures in image creation, and generative models help in healthcare activities such as producing synthetic healthcare images to train diagnostic classifiers. However, the growth of generative AI has generated certain problems [14]. One major concern is the potential for the creation of deep fake content (i.e., fabricated movies or photographs that convincingly represent people stating or performing things they did not do). This raises ethical concerns, including misrepresentation and the possibility of harmful usage [5]. Furthermore, there are worries regarding unfairness and bias in generative AI tools, which might unintentionally maintain and magnify existing biases in the model training data. Establishing a balance between using the promise of generative AI for beneficial uses while dealing with ethical issues remains a critical problem for academics and authorities [4]. This study focuses primarily on ChatGPT, one of the most widely and early utilized generative AI tools.

2.2. Technology Adoption

The adoption of new technology may be influenced by a variety of factors, which have been extensively studied in the literature. These factors can interact with and influence each other, making the adoption process complex and context-dependent. Researchers and practitioners often use models like the TAM [15] the unified theory of acceptance and use of technology (UTAUT) [16] and the diffusion of innovations theory [6] to better understand and predict technology adoption in specific contexts. Accordingly, we identified 13 factors that were reported to be significant in the adoption of new technology, according to the literature discussed below. These factors are ease of use, perceived value, trialability, observability, relative advantage, social influence, ease of learning and training, cost, security and privacy concerns, regulatory and legal factors, innovation characteristics over competing technologies, organizational culture and leadership, and network effects [6, 15-19].

1. Perceived ease of use: The TAM model emphasizes the importance of perceived ease of use in determining user acceptance, as people are more likely to adopt easy-to-use technology. Venkatesh, et al. [16] identified four key factors that impact technology acceptance and use: performance expectancy, perceived ease of use, social influence, and facilitating conditions (e.g., training).
2. Perceived utility or perceived value: Another important factor that may encourage people to adopt a new technology is its perceived usefulness, according to the TAM model. Defining perceived value is challenging due to its abstract nature and reliance on context [20].
3. Trialability: Trial periods or free trials give users a chance to experience the benefits firsthand, which represents another factor that may encourage them to adopt new technology. Trialability is defined as the extent to which an individual can experiment with an invention before reaching an adoption choice [21].
4. Observability: The ability to see the benefits of technology in action can influence adoption decisions, according to [6]. When users can observe others successfully using a technology, it can motivate them to adopt it as well.
5. Relative advantage compared to previous technologies: Users are more likely to adopt a new technology if it provides a significant improvement over existing alternatives [6].
6. Social influence: Peer pressure and social norms can play a substantial role in technology adoption [17]. People are frequently impacted by the beliefs and actions of individuals in their immediate vicinity.

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7. Ease of learning and training: The availability of training resources and the ease of learning to use technology can impact adoption rates [16]. If a technology requires extensive training, it may face resistance.
8. Cost: The cost of adopting and maintaining a new technology is a critical factor in its adoption [22]. High upfront costs or ongoing expenses can be barriers to adoption, especially for individuals or organizations with limited resources [22].
9. Security and privacy concerns: Concerns about data security and privacy can significantly affect adoption decisions [23]. Users may be hesitant to adopt a technology if they are worried about their personal information being compromised [23].
10. Regulatory and legal factors: Compliance with industry regulations and legal requirements can be a major consideration for organizations and individuals when adopting new technologies [18]. Non-compliance can lead to penalties and legal issues [24].
11. Organizational culture: The culture of an organization and the support of its leadership can impact technology adoption [25]. A culture that encourages innovation and change is more likely to embrace new technologies [26]. Organizational culture describes a set of common presumptions, values, and beliefs that are mirrored in its objectives and activities and that also help individuals comprehend how the company operates [19].
12. Network effects: Technologies that become more valuable as more people use them can experience network effects [27]. Social media platforms and communication tools often exhibit network effects, where adoption by one user encourages adoption by others [27].
13. Innovative characteristics over competing technologies: The characteristics of the innovation itself, as described in the diffusion of innovations theory [6] can influence adoption. Several factors may define the innovativeness of the new technology, such as compatibility (i.e., whether the new technology is compatible with existing systems), new features, response time, result broadness, cost, and so on [19]. Compatibility reduces the perceived risk and disruption associated with adopting a new technology. Compatibility is a key factor in consumer acceptance [19]. However, the presence of competing technologies or alternatives can affect adoption decisions [28].
14. Ethical concerns: These concerns describe the potential moral dilemmas arising from the integration and use of generative AI. Although many prior studies have not categorized ethical concerns as a distinct factor in adopting new technology, often addressing them under the umbrella of security and privacy issues, we chose to examine them separately. This decision was taken since many authors and users have raised ethical considerations associated with employing ChatGPT in higher education settings, particularly concerning plagiarism and related behaviors [29, 30].

2.3. Literature Review

Numerous studies have delved into ChatGPT since its inception. In this review, our emphasis lies in the literature dedicated to utilizing generative AI within higher education contexts. The authors in [31] raised awareness of technological trends among academics in African countries, such as Ghana. Through a thematic analysis of interviews with 34 academics in Ghana regarding ChatGPT, they revealed a prevailing lack of familiarity with the tool. The key themes identified encompassed the purpose of ChatGPT, its usability, and its accuracy [31]. Table 1 summarizes the previous studies' findings and the significance of this study over the previous literature.

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Table 1.
Related literature findings.

The Study	Major Findings	Context
Adarkwah, et al. [7]	Generative AI can significantly enhance learning and teaching process in healthcare education.	Higher education
Chanda, et al. [8]	Attitudes, interactivity, benefits, motivation, and compatibility drive students' adoption intentions.	Higher education
Xiao, et al. [9]	ChatGPT enhances EFL writing while several concerns are existed also.	Higher education
Adarkwah, et al. [31]	• Most academics had limited knowledge about ChatGPT and AI in general. • Concerns may be related to ChatGPT usability, accuracy, and enthusiasm.	Higher education
Albayati [11]	• Privacy, security, social influence, and trust may be the most influential factors in adopting ChatGPT.	Higher education
Al-Mughairi and Bhaskar [10]	• Four motivational themes: exploring cutting-edge technologies, personalized teaching and learning experiences, time-saving benefits, and professional advancement. • Five inhibiting themes: accuracy and reliability, reducing human interaction, data security and privacy, and dependency on ChatGPT.	Higher education
Bin-Nashwan, et al. [32]	• Motivational factors: timesaving feature, e-word-of-mouth, academic self-efficacy, and academic self-esteem. • Inhibiting factors: ethics and rules for moral usage.	Higher education
Elbanna and Armstrong [30]	• Motivational factors: individualized learning, evaluation, and content production. • Inhibiting factors: ethical issues, possible bias promotion, a lack of depth knowledge, and security issues.	Higher education
Rejeb, et al. [29]	• Motivational factors: productivity. • Inhibiting factors: issues of ethics and plagiarism.	Higher education
Strzelecki [33]	• Motivational factors: habit, behavioral intention. • Inhibiting factors: incorrect usage.	Higher education
Tiwari, et al. [34]	• Motivational factors: utility, social presence, legitimacy, enjoyment, and motivation. • Ease of use was not significant in the adoption decision.	Higher education
This study	• Explores a broader range of characteristics that may impact the adoption of new technologies, such as ease of use, usefulness, social impact, innovation features, cost, and organizational culture, among others. • Offers valuable insights into why higher education institutions specifically utilize ChatGPT. • Discusses several challenges in the adoption generative AI tools, including. ethics, plagiarism, overreliance, losing jobs, and decreasing the students' capabilities.	Higher education

The authors in Adarkwah, et al. [7] conducted a scoping review on the impact of ChatGPT in healthcare education, revealing that GenAI tools like ChatGPT can significantly enhance teaching, learning, and research. The study highlighted that research in this field is dominated by developed countries, particularly the United States and China, with limited focus on the African region [7]. Similarly, the authors in Chanda, et al. [8] examined AI adoption in higher education, identifying key drivers such as interactivity, positive attitudes towards AI, hedonic motivation, perceived benefits, and compatibility, which influence students' adoption intentions [8]. The authors in Xiao, et al. [9] reviewed the application of ChatGPT in EFL writing, finding that while ChatGPT is widely recognized for providing real-time feedback that improves writing quality and efficiency, significant challenges and concerns persist.

The authors in Albayati [11] delved into the factors influencing users' acceptance of ChatGPT as a daily reference tool. The study employed an integrated model that combines the TAM model with four novel external components: privacy, security, social influence, and trust [11]. In Al-Mughairi and

Bhaskar [10] the authors explored instructors' perspectives on ChatGPT adoption. From their investigation, four motivational themes emerged, including exploring cutting-edge educational technologies, personalized teaching and learning experiences, time-saving benefits, and professional advancement Al-Mughairi and Bhaskar [10]. In Rejeb, et al. [29] the authors employed web mining and natural language processing tools to explore public opinion regarding ChatGPT's impact on education. The findings highlighted ChatGPT's emergence as a fundamental teaching tool benefiting both educators and learners [29].

The authors in [32] aimed to understand the motives behind researchers and academics employing ChatGPT in their professional endeavors. The study revealed that the time-saving aspect, electronic word-of-mouth, academic self-efficacy, academic self-esteem, and perceived stress all positively impact ChatGPT usage [32]. In Elbanna and Armstrong [30] the authors investigated the advantages of integrating ChatGPT into classroom settings. According to their findings, ChatGPT can effectively streamline repetitive tasks and enhance students' learning environments when introduced in the classroom [30]. In Strzelecki [33] the author developed a model examining the factors influencing college students' adoption and utilization of ChatGPT. Habit was identified as the most significant predictor of behavioral intention, followed by hedonic incentives and then performance expectations. Behavioral intention, in turn, emerged as the primary predictor of usage behavior, with personal innovativeness ranking second [33]. The authors in Tiwari, et al. [34] employed the TAM model to ascertain the factors shaping students' attitudes toward adopting ChatGPT. Their study revealed that students generally hold favorable views regarding the integration of ChatGPT in higher education settings [34].

Unlike earlier research, which primarily examined the reasons for ChatGPT usage in higher education institute and its potential future trends, this study expands the scope by exploring a broader range of characteristics that may impact the adoption of new technologies. Furthermore, it offers valuable insights into why higher education institutes specifically utilize ChatGPT. Through its comprehensive analysis, this study contributes significantly to our understanding of ChatGPT adoption, shedding light on previously unexplored aspects and providing fresh perspectives to the existing literature on the subject.

3. Research Method

The research methodology comprises two main components: the initial phase involves conducting statistical analyses on questions about each of the 15 adoption factors delineated in Section 2. 2. Responses concerning each factor were meticulously compiled and transferred into an Excel spreadsheet. Subsequently, the frequency of responses for each choice was tallied to discern prevailing trends and preferences among respondents.

The second phase focuses on analyzing the open-ended questions' responses that forecast the future of ChatGPT as perceived by the participants. The data gathered from open-ended questions was analyzed thematically using [35]. This approach allowed for the discovery and pairing of relevant comments from all participants. Adherence to Miles and Huberman's instructions was critical for methodically processing and coding the collected data. This required moving through four unique stages: data collection, data reduction, data display, and conclusion drafting [36]. First, a survey was created using the Google Documents service, and students at Kaslik University were asked to participate via email communication.

During the data reduction step, all responses from the survey's open-ended part were carefully gathered into a single Word document. This iterative procedure entailed categorizing the content, especially connected to the potential use of ChatGPT, ensuring full coverage of relevant insights. The succeeding data display stage focused on arranging and compressing the acquired data in a readable manner. This was accomplished by creating multiple explanatory diagrams in Excel, which increased visibility and facilitated a more nuanced comprehension of the data. Finally, formulating conclusions required synthesizing the data into tables and figures, allowing for a thorough examination and

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subsequent discussion of the findings. The study's thorough approach aims to give a full knowledge of the elements driving ChatGPT uptake and uncover potential trajectories for its future use in academic contexts.

4. Findings

This section answers the first research question (i.e., the motivations and inhibitors to adopting ChatGPT in higher education institutes). The usage statistics for ChatGPT indicate a clear inclination towards positive engagement, with 219 users expressing a "yes" response. A minority of 20 users provided a "no" response, while 10 respondents opted for a more tentative "maybe later." Since our focus is to study ChatGPT users, we excluded the 30 cases that do not use ChatGPT yet from further analysis. Out of 219 respondents who have been using ChatGPT, the data reveals a relatively balanced representation regarding gender users. There are 101 male participants and 118 female participants.

Examining the age demographics, as shown in Figure 1, a substantial majority of 190 respondents fall into the category of being younger than 22 years old. The age group of 23–28 includes 19 participants, while the 29–41 age range is represented by 8 individuals. Notably, two respondents chose not to disclose their age. Looking at educational backgrounds, the survey highlights varying interests among participants. Business college disciplines such as marketing, management, and accounting attract 71 individuals. Art-related fields have 57 participants, while science and engineering draw in 53 and 38 respondents, respectively. Finally, considering the academic level, a significant portion of the 211 participants is currently pursuing undergraduate studies, indicating a prevalence of users in the early stages of their academic journey. In contrast, a smaller group of 8 respondents are at the master's level, showcasing a diverse mix of educational pursuits among ChatGPT users.

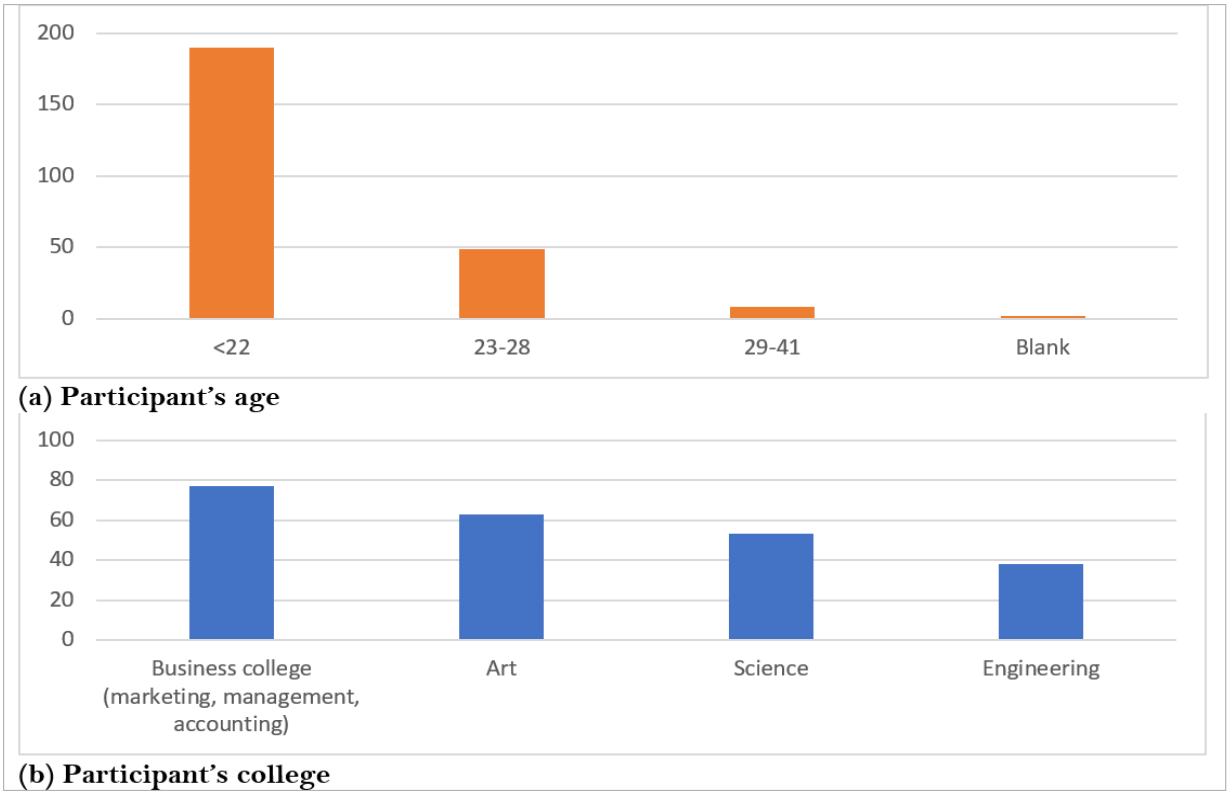

Figure 1.
Participant demographics.

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4.1. Perceived ease of use

The majority of respondents, numbering 139, find ChatGPT to be very easy to use. This overwhelming positive sentiment suggests a user-friendly interface and seamless interaction for a significant portion of students. A secondary group of 50 participants considers the platform somewhat easy to use, indicating that while there may be areas for improvement, the overall usability is still generally favorable. A smaller subset of 23 respondents adopts a neutral stance. This group may reflect a diverse range of student experiences, with opinions evenly spread between positive and negative perceptions. A limited number of six students find ChatGPT somewhat difficult to navigate or interact with. This provides insights into potential challenges faced by a minor segment of the student base, indicating specific areas that might benefit from improvement. Remarkably, no respondents report finding ChatGPT very difficult to use, suggesting a high level of accessibility and user-friendliness in the eyes of the surveyed students. Finally, a single participant opted not to provide an answer, leaving their perspective on ease of use uncharted within the scope of this analysis.

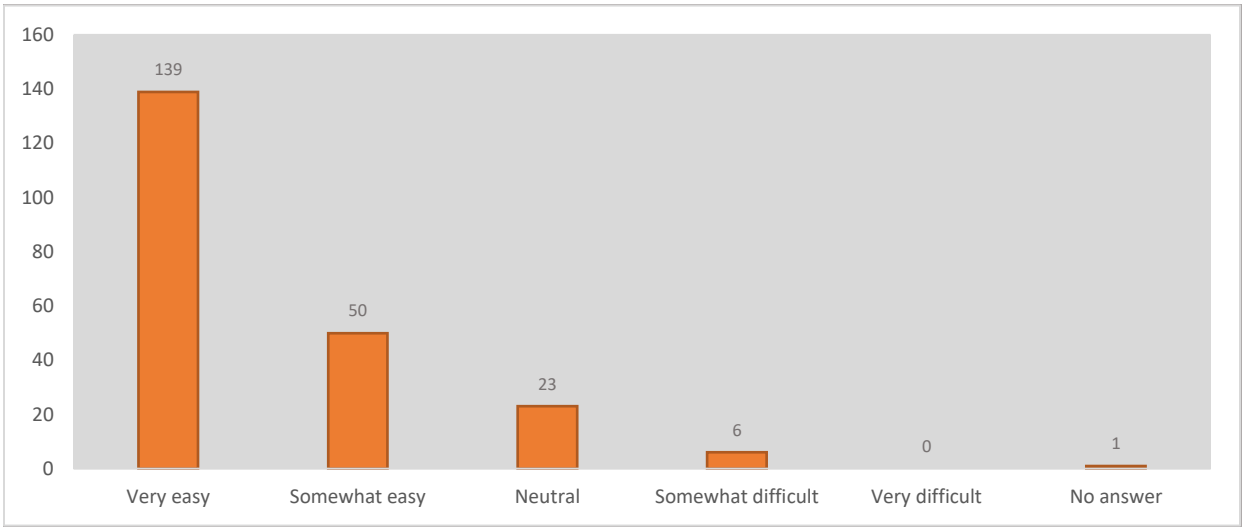

Figure 2.
Perceived ChatGPT ease of use.

4.2. Perceived Value

A notable 56 respondents express the view that the language model adds strong value. This signifies a substantial proportion of students who find ChatGPT to be particularly beneficial or impactful in their interactions, showcasing a positive perception of the model's value. A slightly larger group of 71 participants acknowledges that ChatGPT adds value to their experiences. This category suggests widespread recognition of the model's positive contributions, even though the extent may not be as pronounced as those who believe it adds strong value. In contrast, 40 students adopted a neutral stance. This segment represents a diverse range of opinions, with users who may have mixed feelings or have not formed a strong opinion on the matter. Another 40 respondents expressed the belief that ChatGPT adds only limited value. This perspective suggests that while students acknowledge some positive aspects, there may be room for enhancement or further development to increase perceived value. A smaller subset of 12 participants holds the viewpoint that ChatGPT does not add value to their interactions. This provides insights into a segment of students who may not find the language model beneficial or relevant to their needs. Encouragingly, no respondents chose not to provide an answer, indicating a high level of engagement and willingness to share opinions on the perceived value of ChatGPT.

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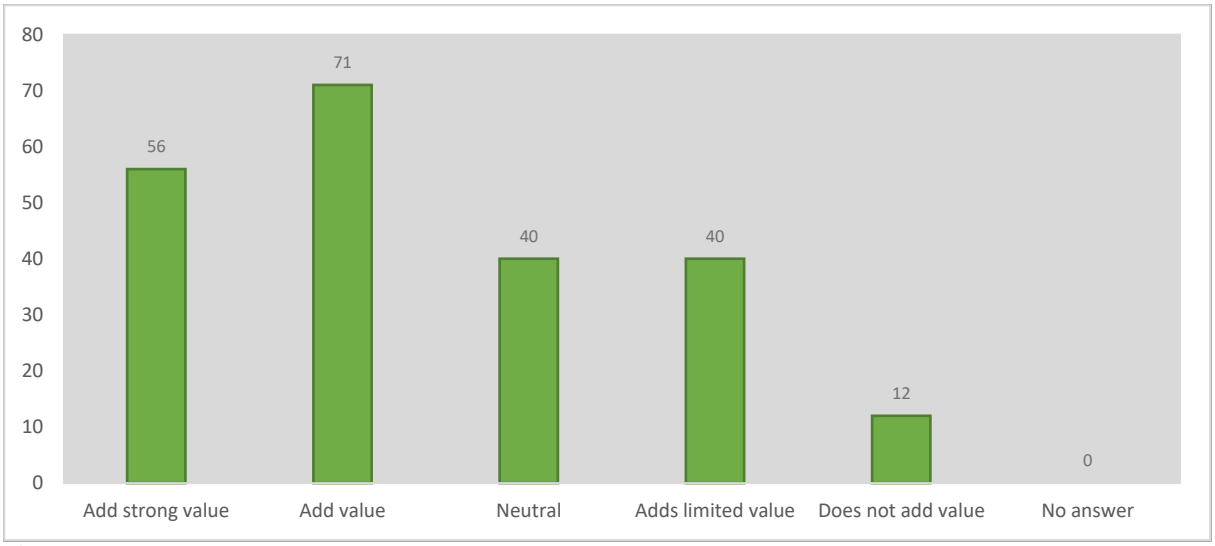

Figure 3.
Perceived ChatGPT value.

4.3. Trialability

106 respondents affirm that they have engaged in trialing or testing the model. This indicates that a significant portion of students actively explore and experiment with the features and capabilities of ChatGPT. Conversely, 111 participants report that they have not engaged in trialing the model. This group may represent students who prefer more established or familiar tools and are less inclined to experiment with new technologies. It also raises questions about potential barriers or challenges that may deter some students from trying out ChatGPT. A small number of respondents chose not to provide an answer regarding their engagement in trialing ChatGPT. While their perspectives remain unknown within the scope of this analysis, it is clear that the majority of users have actively participated in trialing the language model.

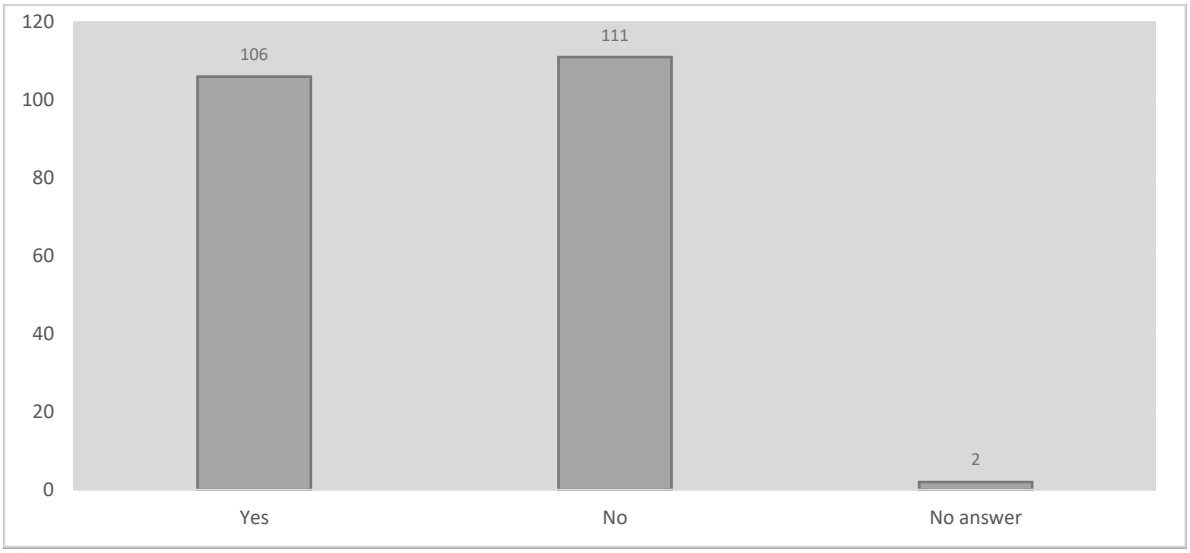

Figure 4.
Students' perceived trialability of ChatGPT.

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4.4. Observability

A significant majority of 192 respondents indicate that they have observed others using the model successfully. This suggests a high degree of visibility and awareness within the student community, as they witness and acknowledge the positive experiences of their peers with ChatGPT. On the contrary, a smaller but still notable group of 27 participants report that they have not observed others using ChatGPT. This group may include students who have limited exposure to the model or who operate in circles where ChatGPT is not prominently utilized. Understanding the reasons behind this lack of observability can provide insights into the model's reach and adoption within different user communities. Importantly, there are no respondents who chose not to provide an answer. This lack of ambiguity indicates a strong willingness among students to share their observations and experiences regarding the usage of ChatGPT by others.

Figure 5.
Students' observability of ChatGPT users.

4.5. Relative Advantage

When comparing ChatGPT to previous tools, a significant majority of 80 respondents perceive it as "much better." This suggests a substantial improvement in student satisfaction and utility, indicating that ChatGPT has successfully addressed or surpassed the limitations of earlier tools. Another group of 81 participants considers ChatGPT to be "better" than previous tools. While not as emphatic as those who find it "much better," this group still acknowledges an enhancement in performance, functionality, or overall student experience compared to their previous tools. A moderate contingent of 46 respondents believes that ChatGPT is "about the same" as previous tools. This group may include students who do not perceive a significant difference in performance or features between ChatGPT and their prior tools, indicating a level of parity in their experiences. A smaller but noteworthy segment of 12 users considers ChatGPT to be "worse" than previous tools. This perspective highlights areas where ChatGPT may not have met the expectations or requirements of these students, providing insights into potential areas for improvement. Importantly, there are no respondents who chose not to provide an answer.

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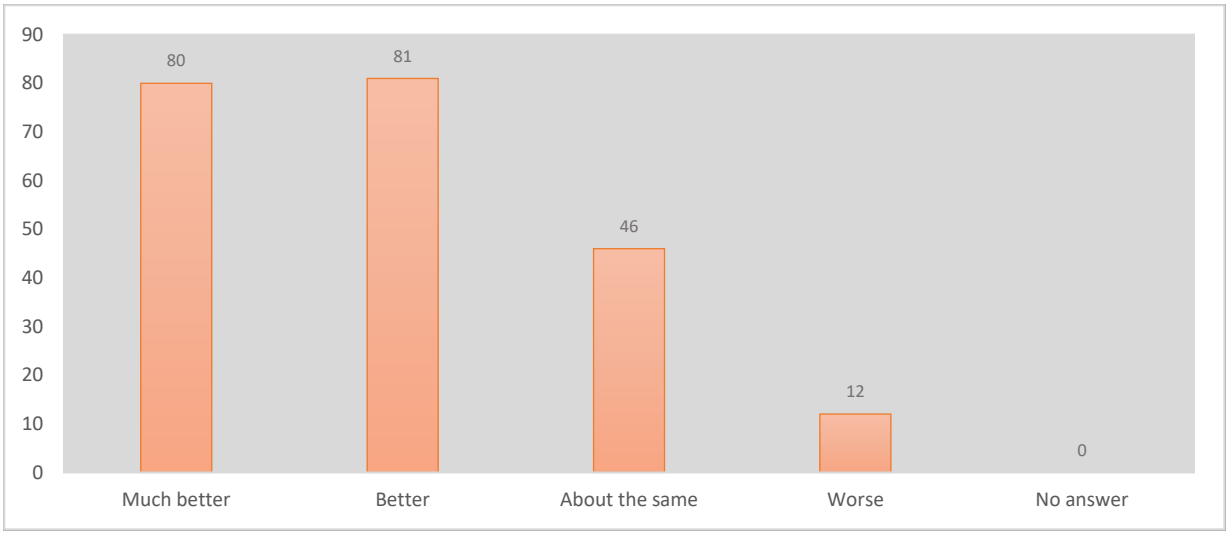

Figure 6.
Perceived relative advantages of ChatGPT over previous tools.

4.6. Social Influence

89 respondents affirm that they were influenced by others' opinions. This indicates a significant impact of peer recommendations or external feedback on their decision-making process, suggesting that social influence plays a notable role in the adoption of ChatGPT within this user group. In contrast, 128 participants assert that they decided to adopt ChatGPT independently, without being significantly swayed by others' opinions. This group reflects a sense of autonomy and self-reliance in the decision-making process, indicating that individual considerations and experiences may have played a more prominent role in their adoption of ChatGPT. Notably, there are no respondents who express a neutral stance, signifying that users tend to have clear perspectives on whether or not social influence played a role in their decision to adopt ChatGPT. A small number of participants chose not to provide an answer, leaving their specific rationale for adopting ChatGPT and the role of social influence in that decision unexplored within the scope of this analysis.

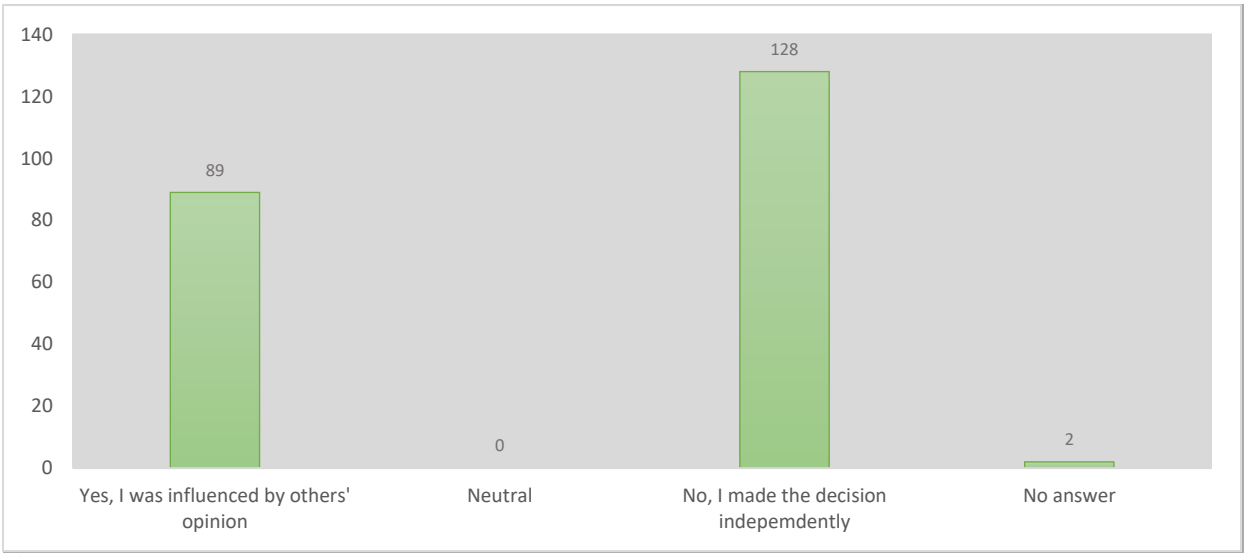

Figure 7.
Social Influence from others to adopt ChatGPT.

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4.7. Ease of learning

A substantial 56 respondents express that ChatGPT fits very well into their learning routines. This suggests a positive alignment between the language model and the individual learning styles or preferences of these students. A closely trailing group of 53 participants found that ChatGPT fits well within their learning process. This acknowledgement underscores a generally positive reception of the model's applicability and effectiveness in aiding learning endeavors. A larger contingent of 76 respondents adopts a neutral stance, indicating a diverse range of opinions regarding the fit of ChatGPT into their learning processes. This group may include students who have mixed feelings or perceive the model as neither exceptionally well-suited nor poorly aligned with their learning needs. A smaller but still noteworthy segment of 24 users feels that ChatGPT fits poorly into their learning routines. This viewpoint shows possible areas for development or changes in the ChatGPT features to better meet academic requirements. A minority of ten participants believe that ChatGPT does not fit into their learning processes. This viewpoint gives insight into a certain set of students who may not find the model appropriate for their learning preferences or goals. Importantly, no participants have chosen not to submit a response.

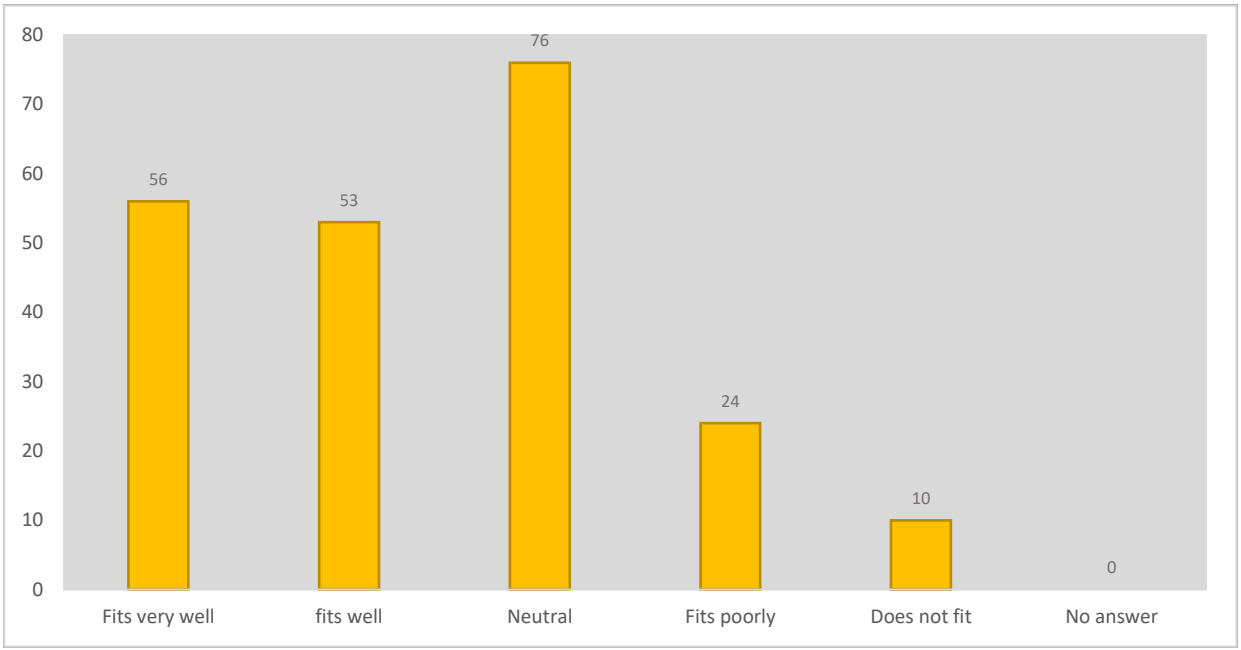

Figure 8.
Ease of learning ChatGPT.

4.8. Cost

The statement "cost was a significant factor in their decision to adopt the model" occurred in 26 responses. This implies that for this group, financial concerns played a significant role in molding their decision to use ChatGPT. A larger segment of 53 participants indicates that, while cost was a factor, it was a minor consideration in their decision-making process. Importantly, no respondents expressed a neutral stance on the impact of cost, signifying that students tend to have clear perspectives on whether cost considerations influenced their decision to adopt ChatGPT. In contrast, a substantial majority of 134 respondents assert that cost was not a factor in their decision to adopt ChatGPT. This suggests that for a significant portion of students, the benefits or features offered by the model outweighed any financial considerations, making the cost of using ChatGPT a non-significant factor in their adoption decision. A small number of participants chose not to provide an answer.

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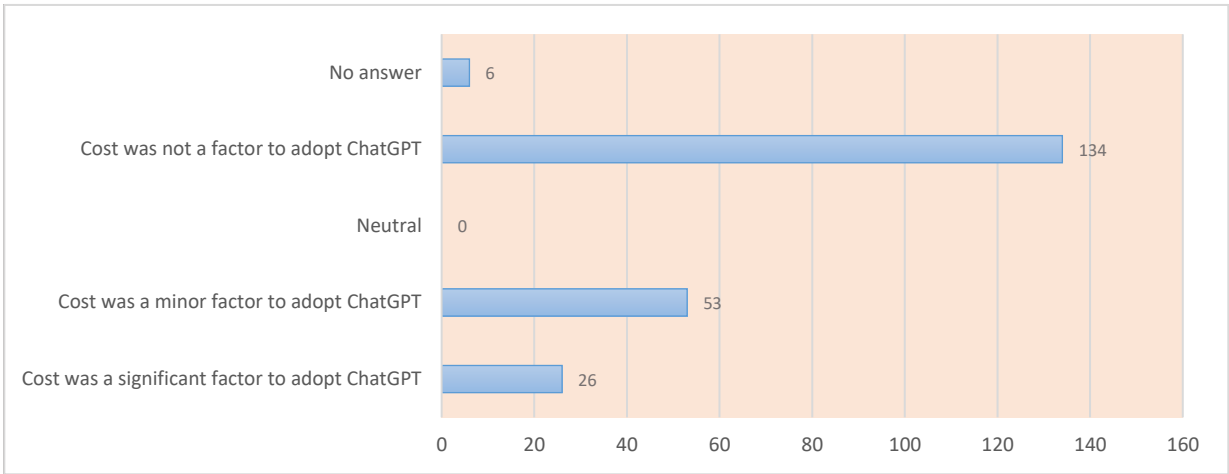

Figure 9.
Cost of adopting ChatGPT.

4.9. Security and Privacy Concerns

38 respondents expressed that they had significant security and privacy concerns about using ChatGPT. This indicates a subset of students who may be cautious or apprehensive about the potential security and privacy implications associated with utilizing the model. A larger group of 83 participants acknowledged having some concerns, but these concerns did not deter them from adopting ChatGPT. This suggests that, while students are mindful of security and privacy considerations, they weighed these concerns against the perceived benefits or utility of ChatGPT and ultimately decided to proceed with its usage. Notably, no respondents expressed a neutral stance. In contrast, the vast majority of 96 respondents stated that they had no worries about security or privacy. This indicates a high degree of trust or confidence in the security precautions and privacy controls adopted by ChatGPT. A small number of participants chose not to provide an answer, leaving their specific considerations related to security and privacy unexplored within the scope of this analysis.

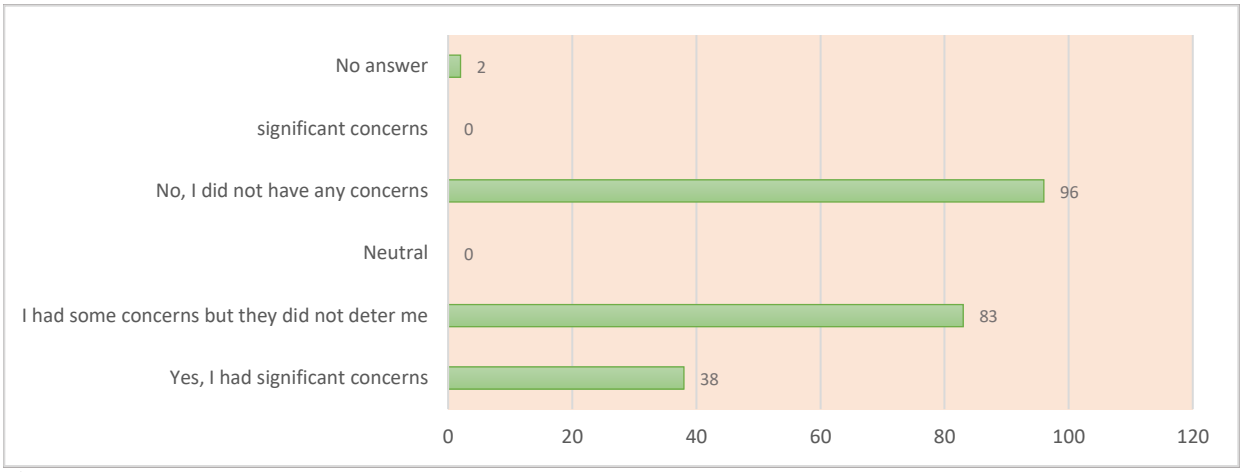

Figure 10.
ChatGPT security & privacy concerns.

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4.10. Regulatory and Legal Factors

59 respondents indicated that they carefully considered legal considerations before using ChatGPT. This suggests a subset of students who are possibly prioritizing compliance and adherence to relevant laws. A slightly smaller group of 55 participants was aware of legal considerations but did not give them significant weight in their decision-making process. This group may acknowledge the existence of regulatory aspects but may not perceive them as critical factors influencing their adoption decision. Notably, no respondents expressed a neutral stance on the impact of regulatory and legal factors. On the contrary, a significant majority of 99 respondents stated that they did not consider legal considerations when deciding to adopt ChatGPT. This suggests that, for a substantial portion of students, legal factors are not perceived as crucial determinants in their decision-making process. A small number of six participants chose not to provide an answer, leaving their specific considerations related to regulatory and legal factors unexplored within the scope of this analysis.

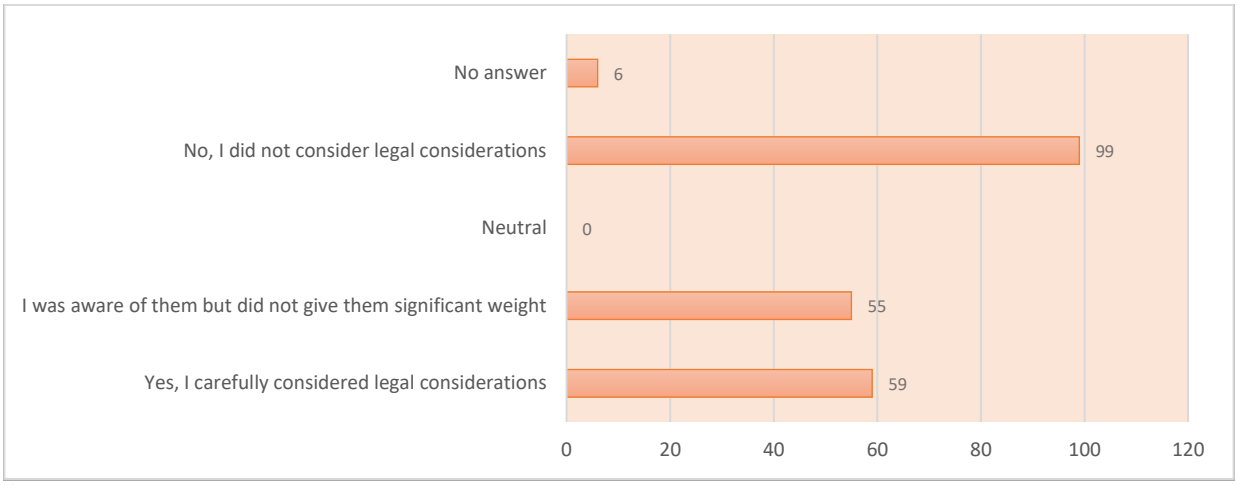

Figure 11.
ChatGPT legal considerations.

4.11. Organizational Culture

When assessing the impact of organizational culture on the adoption of innovation and new technologies, the responses provide a nuanced perspective. 32 respondents indicated that their institute highly encourages innovation and technology adoption. This suggests a positive organizational culture that actively promotes and supports the integration of new technologies and innovative practices. A slightly smaller group of 29 participants notes that their institute somewhat encourages innovation and technology adoption. While not as strongly supportive as the previous group, this still implies a generally favorable organizational culture regarding technological advancements. A substantial number of 95 respondents express a neutral stance, suggesting a diverse range of experiences within the survey group. This may reflect varying degrees of organizational support for innovation and technology adoption across different higher education institutes. On the flip side, 47 participants mentioned that their institute somewhat discourages innovation and technology adoption. This indicates challenges or limitations within the organizational culture that may hinder a more enthusiastic embrace of new technologies. A smaller but still noteworthy group of 14 respondents state that their institute highly discourages innovation and technology adoption. This perspective suggests a less favorable organizational culture that may pose significant barriers to the introduction of new technologies. A small number of participants chose not to provide an answer.

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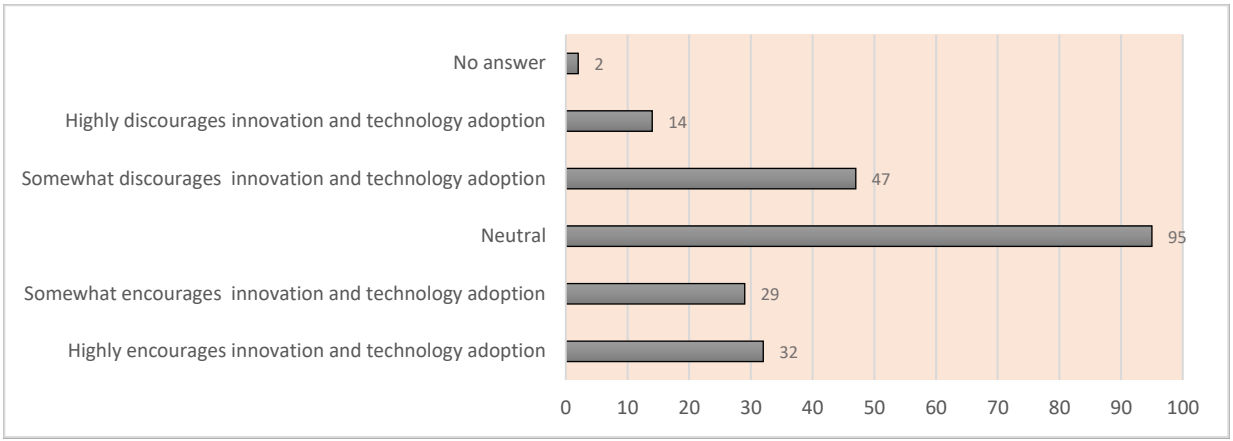

Figure 12.
Organizational culture support.

4.12. Network Effects

A substantial 175 respondents affirm that they have observed an increase in value as more users have adopted the ChatGPT model. This suggests a positive correlation between the growing user base and the perceived value of ChatGPT, indicating that the model's utility or effectiveness may be enhanced as more individuals engage with it. Notably, no respondents expressed a neutral stance on the impact of the network effect. Conversely, 44 participants report that they have not observed a significant increase in value with the growing student base. This perspective may reflect diverse student experiences, suggesting that for some, the network effect may not have had a substantial impact on the perceived value of ChatGPT. Importantly, there are no respondents who chose not to provide an answer.

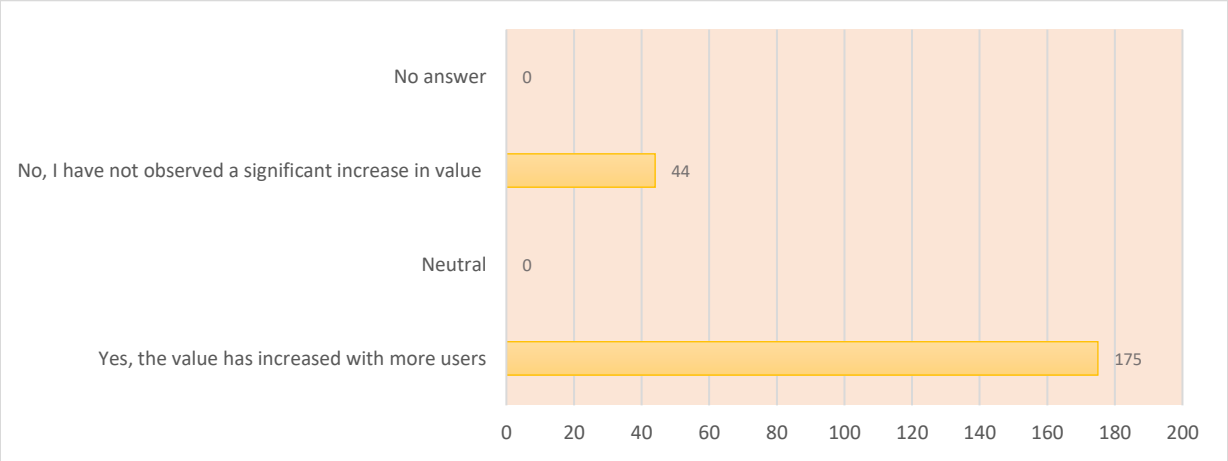

Figure 13.
Impact of network on adopting ChatGPT.

4.13. Innovation Characteristics over other Competing Technologies

The factors influencing the adoption of ChatGPT over other alternatives appear to be diverse, as indicated by the responses. A significant majority of 112 respondents highlighted that the superior features and functionality of ChatGPT played a pivotal role in their decision. This suggests that users value the specific capabilities and performance of ChatGPT in comparison to other options. 46 participants noted that recommendations from peers or other sources influenced their decision to adopt

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ChatGPT. This reflects the impact of social influence and word-of-mouth recommendations in the adoption process. For 22 respondents, cost-effectiveness was a key consideration in favor of ChatGPT. This suggests that the pricing model or overall affordability of ChatGPT contributed to its attractiveness as a choice.

20 participants emphasized the importance of compatibility with existing systems, indicating that ChatGPT integration capabilities played a crucial role in their decision. A smaller subset of 2 respondents values the faster response time of ChatGPT compared to other alternatives, indicating that speed is a critical factor for these students. In a few cases, 2 respondents mention time constraints as a factor; 2 participants mention that they use other generative AI tools instead of ChatGPT; another 2 respondents indicate that they were unaware of other generative AI tools; 2 participants note the appeal of wide-ranging results from ChatGPT; and another 2 respondents mention that ChatGPT is the most commonly seen on social media, highlighting the potential impact of social media visibility on adoption decisions. Two participants mentioned that ChatGPT is perceived as the smartest tool. 1 respondent noted time-saving as a factor, and 4 participants chose not to provide an answer.

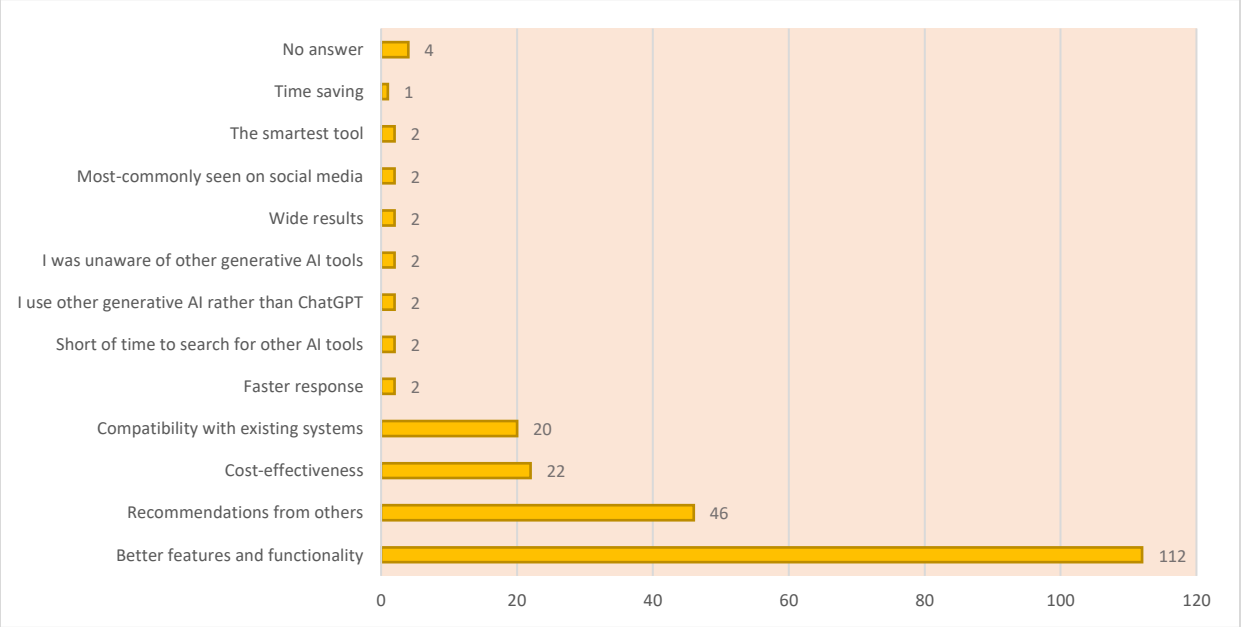

Figure 14.
Innovative characteristics of ChatGPT over other tools.

4.14. Ethical Concerns

Addressing the ethical considerations surrounding ChatGPT usage, a majority of 101 respondents perceive these concerns as minor and believe that they can be effectively addressed. This suggests a generally optimistic perspective among users regarding the ethical implications of utilizing the language model. On the contrary, 60 participants expressed the stance that there are no discernible ethical concerns associated with ChatGPT. This viewpoint underscores a sense of confidence or satisfaction with the ethical safeguards in place, according to their perceptions. Conversely, 56 respondents indicate that there are multiple ethical concerns related to ChatGPT. This subgroup highlights a more cautious or critical perspective, emphasizing the need for attention to ethical considerations in the development or deployment of the language model. Notably, a small number of participants chose not to provide an answer regarding their stance on ethical concerns. The absence of a response from this group adds a layer of complexity to the overall analysis, leaving room for speculation about potential reservations or uncertainties among these individuals.

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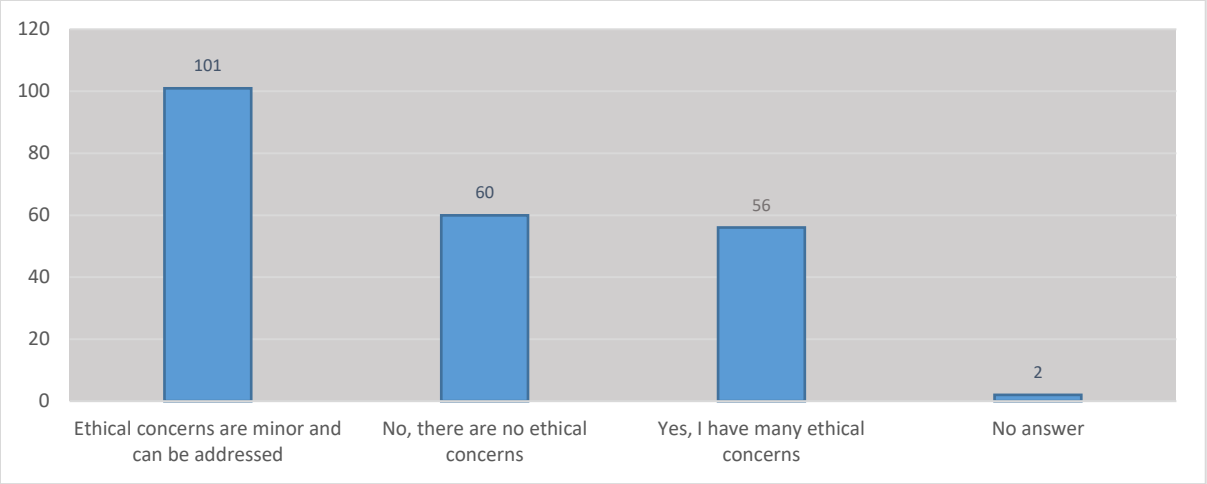

Figure 15.
Ethical concerns about using ChatGPT in higher education settings.

5. Challenges and Future Expectations about Using ChatGPT

This section answers the second research question (i.e., the future trends and challenges of using ChatGPT in higher education institutes). This section explores the results derived from the open-ended question responses. Through thematic analysis, as detailed in Section 3, we examined the collected feedback. Our analysis reveals three primary themes: challenges, bright forecasts, and gloomy forecasts regarding the utilization of ChatGPT in higher education institutes. The expectations regarding the future of ChatGPT in higher education institute appear to be mixed, as reflected in the responses. 49 respondents express a positive future, anticipating favorable developments and contributions from ChatGPT in the field of education. This suggests optimism about the potential benefits and advancements that the model could bring to higher education institute. On the other hand, about 50 percent of participants had negative anticipation, reflecting concerns about ChatGPT's influence on higher education institute. Twenty respondents emphasize the significance of restrictions on utilizing ChatGPT in higher education institute. This indicates a realization of the necessity for explicit norms and rules to regulate the ethical and responsible usage of AI technology in academic settings. A large proportion of the 100 participants did not submit a response.

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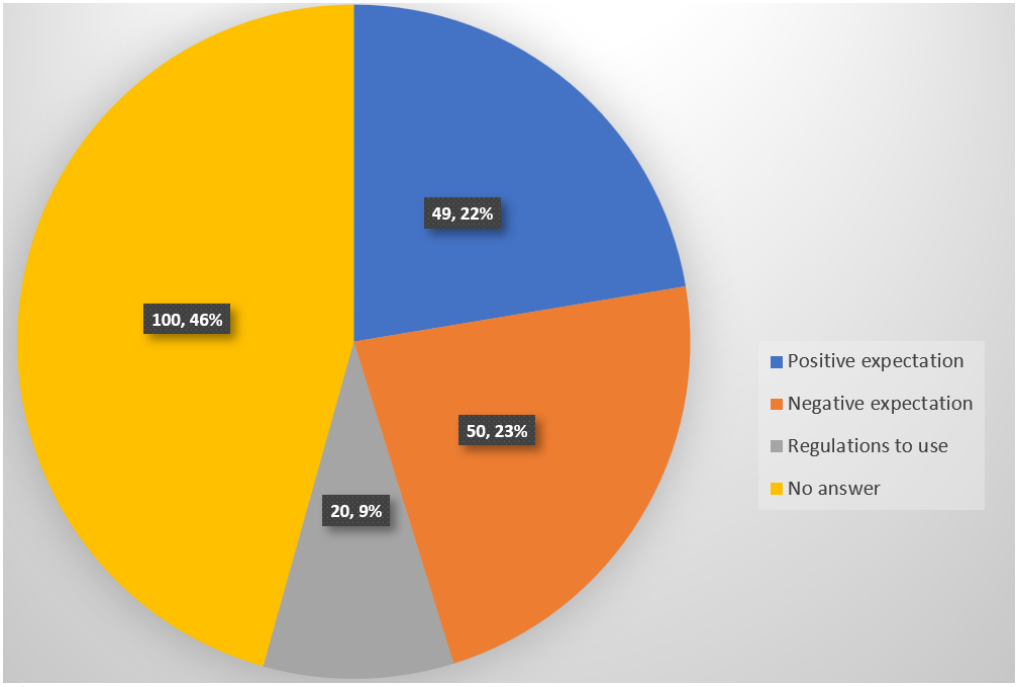

Figure 16.
ChatGPT future prediction.

5.1. Challenges of Using ChatGPT in Higher Education Institutes

We collected a total of 50 negative remarks regarding using ChatGPT. These replies indicate a variety of concerns about the possible obstacles to integrating ChatGPT into the educational scene. As AI technologies progress, they emphasize the importance of carefully considering their ethical, societal, and educational ramifications. The replies highlight a variety of problems and considerations. Several perspectives emerged regarding the future implications of ChatGPT on education. Four respondents expressed caution, citing concerns about the potentially harmful impact of ChatGPT on education and the current generation. Conversely, eight contributors offered a nuanced viewpoint, expressing optimism about certain aspects of ChatGPT while also harboring reservations about others. This balanced attitude reflects a consideration of both advantages and downsides. In terms of its practical benefits, six participants believed that ChatGPT may offer modest advantages, particularly for tasks requiring higher levels of intellect. This perspective suggests that ChatGPT may be more suitable for specific, less complex tasks. Additionally, another group of six students perceived ChatGPT to have limited influence on learning, suggesting that its impact may be limited in scope or utility.

Concerns were also raised regarding potential negative consequences. Four participants expressed worries about an increase in plagiarism levels, attributing this concern to ChatGPT's text creation capabilities. Five students predicted a negative impact on the quality of assignments, expressing apprehensions about the authenticity and creativity of student work facilitated by ChatGPT. Moreover, ten participants expressed apprehensions about the potential displacement of roles and occupations due to ChatGPT, particularly in specific industries. Additionally, seven interviewees anticipated a negative effect on levels of intelligence, research, and creativity, highlighting concerns about potential limitations associated with the use of ChatGPT in these domains. These varied perspectives underscore the complexity and multifaceted nature of the discussions surrounding ChatGPT's integration into educational practices.

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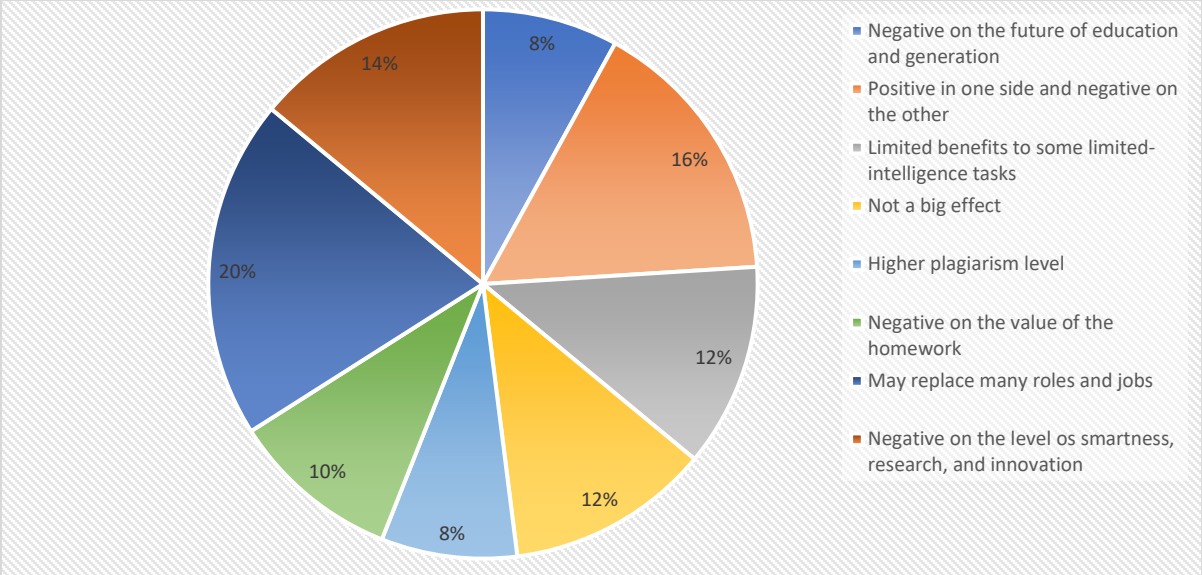

Figure 17.
Negative predictions about ChatGPT future.

5.2. Positive Expectation of Using ChatGPT in Higher Education Institutes

We received a total of 49 negative feedbacks about the usage of ChatGPT in the future. The positive expectations regarding the future of ChatGPT in higher education institute indicate optimism about its potential benefits. These positive expectations collectively convey an optimistic outlook on the potential positive impact of ChatGPT on higher education institute. Anticipated benefits include its foundational role in future higher education institute, increased student dependence, improved educational processes, and widespread integration across various courses. These perceptions contribute to the evolving narrative around the potential transformative role of AI technologies in the educational landscape.

- Future education will be based on generative AI. Eleven respondents expressed a positive expectation that future education will be heavily based on ChatGPT. This perspective suggests a belief in the transformative impact of the model on educational methodologies and practices.
- Students will depend on ChatGPT more than other tools like Google. Eight participants anticipate a shift in student dependence, with ChatGPT surpassing other tools like Google in terms of utility and reliance. This indicates a positive perception of the model's capabilities and potential superiority over existing tools.
- The education process will be easier for students and teachers. The 24 participants think that the incorporation of ChatGPT will make the educational process more convenient for learners as well as instructors. This indicates confidence in the model's capacity to improve productivity and efficacy in a higher-educational setting.
- It will be used as a tool in many courses. Six participants anticipate the widespread use of ChatGPT as a tool in various courses. This suggests a positive expectation that the model will become an integral component across diverse academic disciplines.

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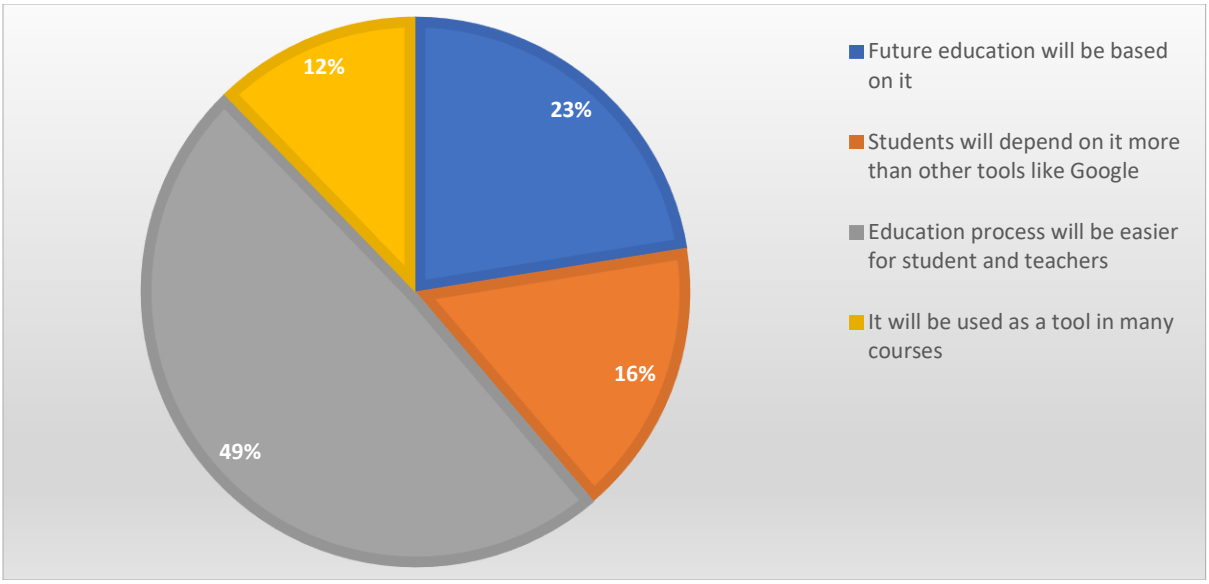

Figure 18.
Positive predictions about ChatGPT future.

5.3. Recommendation about Future Usage of ChatGPT in Higher Education Institutes - Rules and Regulations

Our analysis of the responses of respondents who focused on the need for creating rules and regulations for ChatGPT or similar generative AI tools to be used in higher education institutes could identify three main themes: the need to recognize the benefits of generative tools, the need to teach students how to get the best out of these tools, and the need for creating rules to use these tools. Eight participants believe that understanding the advantages of ChatGPT may take time. This viewpoint recognizes a possible curve of learning or time for adaptation until the model's full benefits are recognized. Five participants stress the necessity of educating students on how to properly utilize ChatGPT. This viewpoint emphasizes the importance of providing students with the skills and information necessary to maximize the advantages of engaging with generative AI. Seven of the participants indicate a desire to create rules expressly for ChatGPT use in higher education institute. This is an understanding of the significance of developing standards and regulations to guarantee ethical and responsible use of the new technology.

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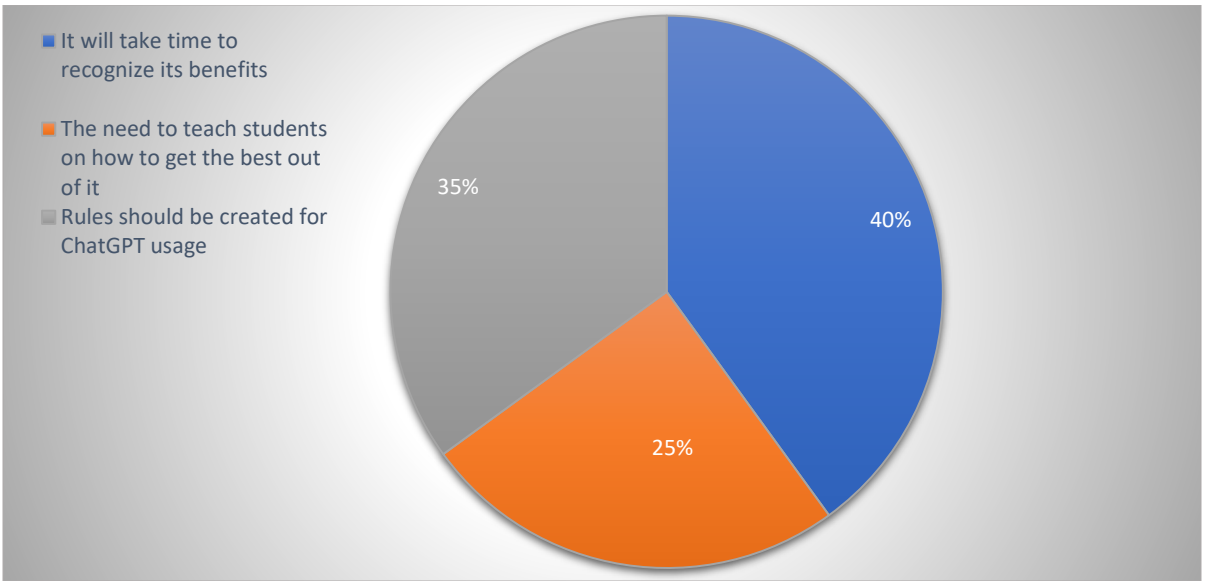

Figure 19.
Recommendations about ChatGPT future.

6. Discussion

The goal of this study is to analyze the use of generative AI tools in educational environments by addressing RQ1 and RQ2, which look at the motivations for utilizing the ChatGPT tool and its future opportunities. Sections 4 and 5 include an extensive discussion of these probes. This section goes into the research inferences, stressing the implications of the findings, the limitations of the study, and the potential research avenues involving integrating the use of generative AI in educational contexts.

6.1. Summary of the Findings

The results show a wide range of viewpoints on ChatGPT's contribution to the higher education process. Positive expectations include confidence about its critical role in future education and improved educational procedures. However, there are questions regarding accuracy, potential detrimental consequences for creativity and abilities, and ethical problems.

- Ethical concerns: A significant number of respondents (56) voiced ethical concerns regarding ChatGPT, while a majority (101) deemed ethical concerns to be modest and manageable. This suggests a nuanced perspective, with users recognizing ethical considerations but varying in the degree to which they perceive them as significant. These results are in line with the findings reported in Elbanna and Armstrong [30] and Rejeb, et al. [29].
- Ease of use: The majority of users find ChatGPT very easy (139) or somewhat easy (50) to use. This indicates a positive perception of the model's user-friendliness, contributing to a favorable overall experience among users. This result is in line with the findings in [11].
- Perceived value: A significant number of respondents (127) see ChatGPT as adding strong or moderate value. This implies that the majority perceives ChatGPT as a valuable tool. This result is in line with the findings in Adarkwah, et al. [31] and Al-Mughairi and Bhaskar [10].
- Learning process: A substantial number (109) find ChatGPT fitting very well; however, there are respondents (34) who express a neutral or negative view about its alignment with the learning process. These findings are in line with those in [37].
- Trialability: A majority (111) indicates a negative stance on the trialability of ChatGPT, possibly indicating reservations or constraints in trying out the technology.

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- Observability: A large majority (192) reports observing others using ChatGPT successfully, indicating a high level of observability and positive user experiences. This result is consistent with the findings in [34].
- Relative advantage of ChatGPT over previous tools: The majority (161) perceives ChatGPT as better or much better than previous tools, highlighting a significant improvement in student satisfaction. This result is consistent with the finding in [11].
- Social influence from others to adopt ChatGPT: A considerable number (89) acknowledge being influenced by others' opinions in adopting ChatGPT. This suggests the significant impact of social influence on adoption decisions. This result is contrary to the findings of Albayati [11] and Strzelecki [33].
- Network effect: A substantial majority (175) observes an increase in the value of ChatGPT with more users, indicating a positive network effect [38].
- Cost of using ChatGPT: The majority of respondents (134) stated that cost was not a factor in their decision to adopt ChatGPT.
- Security and privacy concerns: While a significant number (96) expresses that there are no security or privacy concerns when using ChatGPT, a notable number of respondents (38) express significant security and privacy concerns, and a larger group (83) acknowledges having some concerns but not the extent of deterrence. This highlights the need for addressing user apprehensions about the security and privacy aspects of ChatGPT. These results are in line with the findings in Al-Mughairi and Bhaskar [10] and Albayati [11].
- Regulatory and legal factors: Participants exhibit diverse stances on considering legal factors, with a group (59) carefully considering legal considerations, another group (55) being aware but not giving them significant weight, and a substantial majority (99) not considering legal factors at all. This reflects varying degrees of attention to legal aspects in the decision-making process [10, 39].
- Organizational culture: Participants, regarding organizational culture in higher education institutes, indicate a mixed landscape, with varying levels of encouragement or discouragement for innovation and technology adoption. A substantial number (95) expresses a neutral stance, showcasing diverse organizational cultures within the surveyed higher education institute.
- Innovation compared to other technologies: Responses highlight various factors influencing their adoption of ChatGPT over other alternatives. The majority (80) perceives ChatGPT as much better than previous tools, while others' recommendations (46) and compatibility with current systems (20) have also been identified as important considerations. These findings are consistent with those in [10, 32, 40].

6.2. Research Implications

Several research implications can be identified in this study. First, the study provides insights into how users perceive the benefits and challenges of using ChatGPT in higher education environments. Future research may go deeper into the factors that shape these perceptions and how they evolve. Additionally, the wide range of expectations regarding the use of ChatGPT indicates diverse viewpoints among users, such that a significant number perceive positive outcomes and others perceive concerns. This diversity may indicate the complexity of generative AI tools in education, which increases the importance of ongoing discussion and evaluation as these technologies progress. Accordingly, research may explore how effectively the capabilities of generative AI tools may be communicated and concerns may be addressed. Furthermore, the students' feedback reflects an awareness of the evolving nature of generative AI tools in education, touching upon issues such as the time required to appreciate their benefits and the necessity of developing rules to guide students in using these advanced models appropriately. The findings provided in this study, as well as future research across various educational

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settings, may enhance the development of a set of clear guidelines that ensure responsible and effective generative AI tool implementation.

6.3. Practical Implications

The research findings emphasize the importance of establishing clear norms and regulations to govern the ethical use of ChatGPT within educational settings. Acknowledging the influence of organizational culture on technology adoption is essential for crafting regulations that facilitate the seamless integration of new technologies within educational settings. This information can serve as a foundation for generative AI tool designers and policymakers to develop clear and ethical usage guidelines. The findings also suggest an opportunity for higher education institutes to explore and incorporate generative AI tools into their curricula. Moreover, the findings revealed that the users' preferences and decision-making processes interact. This can help these tool providers refine and improve their solutions to better align with the needs and expectations of users. Lastly, understanding user interests is crucial to promoting effective communication strategies and instructional materials to achieve successful adoption and utilization of generative AI tools.

6.4. Research Limitations

This survey relies on a specific sample, so the findings may not apply generalizability to larger populations or different educational contexts. Since responses are self-reported, there's a chance of bias, as the interpretation of different terms such as "negative" and "positive" can be interpreted differently. Conducting further research in various educational settings with a larger sample size, as well as longitudinal studies to track changes in attitudes toward ChatGPT over time, may offer clearer insights into its impact on the educational process. Additionally, future studies may investigate specific issues, such as ethical concerns or users' preferences, to address these challenges.

7. Conclusions

Due to the increasing popularity of generative AI technologies like ChatGPT, understanding the motivations and concerns associated with their use in higher education institutes is crucial. While these technologies have the potential to enhance student outcomes, they also pose ethical and influence-related challenges. Therefore, this study aims to explore adoption patterns within the education sector, focusing on the various factors shaping integration and usage. The empirical findings of the study aim to provide insights that inform decision-making and guide future advancements in the adoption of generative AI in higher education settings.

Our research uncovered that ease of use, perceived value, trialability, observability, relative advantage, social impact, and network effect are the key factors influencing students' decisions to adopt ChatGPT. These findings offer a comprehensive understanding of user perspectives and experiences with ChatGPT, which in turn influence adoption decisions. The diverse range of responses highlights the complexities of user interaction with AI systems in educational contexts. These contributions span from enriching academic knowledge and understanding to providing practical insights for industry stakeholders, thus supporting the responsible development and integration of generative AI technology in higher education settings.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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