ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION:

OPPORTUNITIES AND CHALLENGES IN INDIA

by

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Dedication

Dedicated to my parents Late Vidyawati Dubey and: Late Sidheshwar Dubey

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I hereby acknowledge with gratitude the support I received from my mentor and guide Dr Mario Silic,

I am also thankful to my family members, elder brother Dr Vinod S Dubey, wife Mrs Vibha Dubey, and children Priyamvad, Priya, Devisha, and Gaurav. Also, I wish to acknowledge the constant motivation provided by my grandchild Ayansh through his antics.

ABSTRACT

ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION:

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The study focuses on the factors influencing the use of Artificial Intelligence in Education (AIED) in higher education institutions (HEIs) in India. The Indian higher education system continues to face a number of perennial problems which can be summed up as follows:

- rigid academic calendar,
- low employment rate of fresh graduates, and
- ineffective and outmoded lecture-tutorial methods.

AIED offers an interesting chance to resolve these questions by increasing teachers' efficiency, individualization of learning processes, and decreasing bureaucratic demands. However, to the best of the knowledge of the authors, few studies have explored the use of AI technologies in Indian HEIs.

This research will try to assess the effects of AI in the teaching, learning, and administrative functions in the selected Indian HEIs and the determining factors of AI integration. The research specifically examines the following:

- AI in current higher education,
- advantages, and problems of AI usage,
- impact on students' performance, and
- further AI trends in learning.

The method of the research is a quantitative questionnaire intended to collect data from 200 participants from various educational establishments, AI specialists, and Ed-tech firms. The examination employs validated survey instruments from previous literature; the constructs include Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Technology Readiness, and Knowledge about AI. The data collection technique used was an online survey administered to the participants, and content validity was established using a pre-test while the reliability test was conducted using a pilot test.

The Data collected is analyzed by Structural Equation Modelling (SEM) which tests both measurement and structural models to test the relationships between the observed and the latent variables. The analysis shows that Technology Readiness acts as a mediator, which helps to strengthen the positive associations of the components of UTAUT with the behavioral intention to employ AIED. In the same way, the knowledge level of an individual moderates these relationships and affects the individual's perception of the adoption of AI in education.

The research provides a way forward to enable the integration of AI in the Indian higher education system and the importance of focusing on its readiness and awareness amongst the stakeholders. It adds to the existing literature on AI in Indian HEIs and suggests recommendations for AI utilization to counter existing educational issues and improve students' learning opportunities.

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CHAPTER I:

INTRODUCTION

1.1 Introduction

Artificial intelligence (AI) is transforming and disrupting industries across the spectrum. All consumer-facing industries such as retail, healthcare, telecom, hospitality, banks, financial, and insurance are using AI to improve their services and cut unnecessary costs. It is expected that Artificial Intelligence will also present significant opportunities for higher education along with challenges that need to be overcome (Rouhiainen, 2019). AI can help improve learning outcomes as well as enable the use of data to improve educational equity and quality in the developing world. But, despite such a surge in the transformative impact of AI, its impact is yet to be felt in Higher education in India (Cox, 2021). Adopting AI in Higher education also faces several challenges, seven of which have been identified in UNESCO's working paper (Pedró, 2019).

Artificial intelligence is one of the most prominent modern applications of information systems as a field of modern knowledge that is interested in studying and understanding the nature of human intelligence and its simulations to create a new generation of smart computers that can be programmed to accomplish many of the tasks that need a high ability of inference, deduction, and perception, which are qualities that people enjoy It is included in the list of smart behaviours.

India, according to a UN report is the most populous country in the world (Hertog, Gerland and Wilmoth, 2023). India's higher education system is the third-largest in the world after the US and China. But only two Indian universities have qualified to be among the world's top 400, as per World University Rankings for 2021 (Nanda, 2020). India's challenge to improve the quality and inclusivity of higher education is enormous. Some of these challenges are its large population, poor rural IT infrastructure, and low per capita income of

2120 USD (World Bank, 2021). In this context, emerging technologies like AI, Big Data, and cloud computing could significantly help transform Higher Educational Institutions (HEI) in India.

Artificial intelligence applications are important in the fields of life, but they are more important for educational institutions and universities, which represent a great necessity that cannot be dispensed with, as universities today are no longer limited to education, but rather have become an essential part of the system of sustainable development in societies, as it stresses (Aldosari, 2020). The mission of universities today exceeds the traditional function of preserving heritage, identity, and education. Rather, universities today are required to keep pace with technological development through the creation of new methods of education and teaching. So educational reform projects quickly developed their education systems in accordance with the requirements of artificial intelligence, as the plan issued by the Gutenberg Summit in November 2017 for education and culture focused on three priorities for better use of artificial intelligence in teaching and learning represented in developing digital competencies and skills related to digital transformation; Education through data analysis and insight (Tuomi, 2018a). It is expected that Artificial Intelligence will also present significant opportunities to higher education along with challenges that need to be overcome (Rouhiainen, 2019). AI can help improve learning outcomes as well as enable the use of data to improve educational equity and quality in the developing world. But, despite such a surge in the transformative impact of AI, its impact is yet to be felt in Higher education in India (Cox, 2021). Adopting AI in Higher education also faces several challenges, seven of which have been identified in UNESCO's working paper (Pedró, 2019).

The academic efforts of researchers have also accelerated with the exploration of the effects of artificial intelligence on education in general and higher education in particular, (Kriti Khare, Brian Stewart, 2018) emphasized the positive impact of artificial intelligence

applications on student success, and the study (Tuomi, 2018b). stressed the importance of artificial intelligence In providing rich educational environments and the possibilities of solving traditional problems of education using artificial intelligence applications, The (Fryer, Nakao and Thompson, 2019) emphasized the role of robots in developing students 'interests in learning other languages. The study was conducted by (Ma and Siau, 2018). emphasized the importance of artificial intelligence in developing higher education and changing traditional methods of education. In the opposite context, many studies reviewed the challenges arising from applications of artificial intelligence, especially with regard to the traditional functions of human resources, where a study (Ocaña-Fernández, Valenzuela-Fernández and Garro-Aburto, 2019) confirmed that the great challenge facing the University of the new millennium in the urgent need as a result of the development of information technology lies The need to plan, design, develop and implement digital skills to better train professionals who can understand the technological environment and develop it according to their needs. Some researchers (G. Harkut and Kasat, 2019). also stressed the growing fears of the spread of artificial intelligence, and those fears were the lack of confidence: as it revolves around science, technology, and algorithms that most individuals do not know, which makes it difficult for them to trust, and reduces the need for manpower This increases the chances of spreading unemployment.

With the help of AI, learning can be customized. It can cater to the specific needs of all categories of students. Every student would enjoy receiving a completely new and unique educational approach that is tailored to the individual needs of the students. An AI-powered library can help in better learning experiences in higher educational institutes (Cox, Pinfield and Rutter, 2019). AI could help in such a tailored individual approach to learning. Different applications of AI would help personalize the learning experience (Kumar, 2019). However, the present AI technology may not be fully prepared for such an experience and may need

more time to develop. Chatbots can help to provide personalized help to solve any critical issue. It can provide solutions to individual students' needs. An AI-enabled chatbot could help answer individual students' queries with accuracy as the technology matures (Chrisinger, 2019). These AI-powered chatbots can provide answers to students outside of the regular classes. These kinds of AI-powered systems can also help in admission queries of the students, administrative decision-making, and so on. AI technology may also be useful for preparing 'smart content' Kumar (2019) This could be digitized guides of textbooks, and customizable digital learning interfaces at all levels of education. In a way, AI could help in higher education in many ways (Ahmad, 2019). The work-load due to the massification of students is increasing. At this juncture, there is a need for the application of modern technology like AI to address this ominous situation (Kübler et al., 2015). However, unless the students, teaching and non-teaching staff including administrative staff (stakeholders) adopt AI, its benefit cannot be perceived. However, it appears that there are very few explicit studies regarding the adoption of AI in higher education in the Indian context (Panchamukhi, 2006).

India, by 2024 will be the most populous country in the world. India's higher education system is the third-largest in the world after the US and China. But only two Indian universities have qualified to be among the world's top 400, as per World University Rankings for 2021 (Nanda, 2020). India's challenge to improve the quality and inclusivity of higher education is enormous. Some of these challenges are its large population, poor rural IT infrastructure, and low per capita income of 2120 USD (World Bank, 2021). In this context, emerging technologies like AI, Big Data, and cloud computing could significantly help transform Higher Educational Institutions (HEI) in India.

The New Education Policy of India1 of the Indian Government provides a strategic thrust to these new and emerging disciplines, e.g., artificial intelligence (and big data analytics), to enhance the teaching-learning experience in physical as well as online education. The aim is to bring India's Gross Enrollment ratio for higher education from currently 27.4 percent (37 million students in 2020) at par with developed countries such as the US (88.2%), Germany (70.3 %), France (65.6%), UK (60.6 %), Brazil (51.3%t) and China (49.1 %). New Education Policy (NEP) 2020 recognizes that technology's impact on education will be in multiple ways, most of which are not yet understood properly. New technologies such as artificial intelligence, machine learning, and others will be needed for student development and change what and how students learn. This requires extensive research both on the adoption of technology and the behavioural aspect of various stakeholders.

This study aims to understand if there are opportunities for Indian HEI to make significant changes in the teaching and learning process using Artificial Intelligence (and associated technologies) to make it more inclusive. And if it is so, what are the challenges to be overcome? The study then will focus on solutions (tools, technology, and business model) available to HEI from technology providers (including Ed-tech startups) in this transformative journey. The outcome of this research will be to identify key metrics and best practices while adopting AI to enhance learning outcomes for students and improve education equity and quality. By doing so, Indian HEI can compete with their world peers in quality, equity, and equality.

1.2 Research Problem

The Indian higher education system suffers from various issues such as inflexible academic structure, uneven capacity across subjects, and lack of autonomy (Menon et al.,

[1] National Education Policy 2020, Ministry of Human Resource Development, Government of India. Accessed on 12th May, 2021. Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

2014). Challenges such as low employability of graduates, poor quality of teaching, and lack of universal inclusivity of higher education exist in Indian HEI (Khare, 2018). Despite its rapid growth, higher education in India has not scaled to the same levels of quality as its world peers. The investment in the latest technologies and ensuring its proper implementation holds the potential to resolve some of the problems plaguing the system (Menon et al., 2014). AIED presents an opportunity for Indian HEI to meet the Ministry of Human Resource Development's target of achieving 32% GER by 2022 from currently 26.3% (2018-19) and 50% by 2030. Indian Government also intends to add approximately 35 million more seats in higher education2. Therefore, it is necessary to investigate how AI would help teachers enrich their teaching and reduce their administrative load, simultaneously how AI can help improve students' learning outcomes, which should be more personalized, making them more employable.

Higher education institutes today face enormous challenges, the significant ones being disengaged and distracted students (Fulford, 2017), the increasing ineffectiveness of traditional one-way instruction (Barkley and Major, 2018) due to large classroom size, faculty overloaded with administrative work (Ylijoki and Ursin, 2013) amongst the others. Using big data analytics and artificial intelligence, students can access personalized learning experiences, which may address some of these challenges. The AI applications provide opportunities to realize the students' personalized learning needs and help enhance the efficiency of educators. Therefore, the future development of the education sector will be closely related to the development of AI. In other words, the development of novel technologies and intelligent machines will stimulate future education (Chen et al., 2020). The benefits of this technology cannot be realized unless the students, educators, and administrative staff of higher education institutions adopt the AI application.

[2] (https://pib.gov.in/PressReleasePage.aspx?PRID=1642061).

Although the research on AI in the education sector has gained scholarly attention, there is little focus on the adoption of AI technologies in higher education. Existing studies focus on discussing the opportunities and challenges existing in the domain, and emerging trends (Chassignol et al., 2018), providing recommendations for implementing AIED in different teaching and learning settings (Hwang et al., 2020). Very few studies directly focus on the adoption of AI adoption in HE in India (Chatterjee and Bhattacharjee, 2020). This study aims to discover how various participants would be able to adopt AI in education and the role of individual-level characteristics in this process.

1.3 Purpose of Research

The purpose of research on AI adoption in higher education is to explore how stakeholders can successfully adopt artificial intelligence in educational institutions. As Artificial Intelligence technology is maturing newer opportunities and challenges are foreseena. this research seeks to identify the opportunities and challenges of implementing AI in higher education and to identify the key factors that can drive successful adoption. The aim is to help educational institutions be better equipped to leverage the potential benefits of AI and to make student services more effective.

1.4 Significance of the Study

This paper identifying the different ways AI is being implemented in higher learning institutions of India has significance keeping in mind the innate potential of AI in reshaping the face of education.3.

In short, the following impact is expected

[3] https://indiaai.gov.in/article/ai-impact-on-india-ai-in-education-is-changing-india-s-learning-landscape accessed 20102022

- **Comprehending the Present Situation:** Thus, this study provides significant context for understanding the present state of AI usage in higher education in India and the possible extent of its integration alongside the challenges faced.4.
- **Recognizing Prospects:** Therefore, the study has tried to identify areas where AI can complement teaching and learning like custom approach to teaching, increase of access, and strategic information.
- **Forming Policy and Practice:** The findings would be useful in policy debates and could give recommendations with regards to directions on how to introduce AI into tertiary education. enhanced accessibility, and data-informed insights have been named by the users.
- **Facilitating Personalized Learning:** AI has the ability to customize education according to the unique requirements of each student, hence improving learning outcomes.
- **Improving Accessibility:** Artificial intelligence has the potential to enhance the accessibility of education by overcoming geographical and socio-economic obstacles. AI can facilitate data-driven decision making, enabling informed decision making in all aspects of education[123].

Conclusively, conducting a study on the use of artificial intelligence (AI) in higher education in India has the potential to greatly enhance our comprehension of the prospects and difficulties linked to AI in the field of education. It has the potential to provide valuable insights for policy-making and implementation, as well as foster the development of a learning environment that is tailored to individual needs, easily accessible, and guided by data.

[4] https://www.indiatoday.in/education-today/featurephilia/story/pros-and-cons-of-ai-in-indian-education-a-comprehensive-analysis-2387025-2023-05-31

1.5 Research Purpose and Questions

Central Question

The current research focuses on identifying the factors influencing the adoption of AI in higher education. It aims to address the following research questions in this context,

1. What are the antecedents impacting the adoption of AI by the participants of higher educational institutes in India?
2. Does an individual's technology readiness moderate the relationship between components of the Unified Theory of Acceptance and Use of Technology (UTAUT) and behavioral intention to use AIED?
3. Does an individual's knowledge about AI moderate the relationship between components of UTAUT and behavioral intention to use AIED?

CHAPTER II:

REVIEW OF LITERATURE

2.1 Theoretical Framework

Stanford Professor John McCarthy, in 1955, coined the term Artificial Intelligence (AI) and described it as "the science and engineering of creating intelligent machines." Artificial intelligence (AI) has remained a subject of intense interest amongst academicians and Industry professionals alike since then. AI is now even considered as "new Electricity" given its transformative potential across domains (Shana Lynch, 2017).

The preliminary literature review's objective is to identify the body of academic work done in AIEd and see its applicability in the Indian context to address the research problem. Although AI presents immense potential benefits, the market players operating in this domain may struggle to actualize these benefits due to a lack of understanding about the factors affecting stakeholders' intention to adopt AI in the education sector. Therefore, the current study examines the factors influencing various stakeholders' intention to use AI in the education sector.

2.2 Introductions and Background

The use of AI in education has been discussed for a long time. As early as 1966, researchers, Suppes (1966) predicted that millions of students would have access to computer programs as personal tutors rich in content in a few more years. More pieces of evidence advocating the use of intelligent tutoring systems (Woolf, 1988), mainstreaming AIED in education (Cumming and McDougall, 2000), or making AI an effective classroom assistant (du Boulay, 2016) have continued to be mentioned in academic literature. While AI's potential to transform education has been underlined by many researchers yet, it has not been harnessed in the developing countries as expected (Conlon and Simpson, 2003).

Application of AI can occur in two fundamental areas of education: what to teach and how to teach. The use of AI to promote personalized learning and improve learning opportunities and outcomes for students has been documented in several studies (Laanpere et al., 2014; Luckin et al., 2016; Birjali, Beni-Hssane and Erritali, 2018; Luckin, 2018; Montebello, 2018; OECD, 2018; Pedró, 2019). In the domain of the application of AI in higher education, broadly, two kinds of applications have been discussed in the extant literature: strategic or institutional-level applications and teaching and learning-related applications (Bates et al., 2020). The institutional-level applications deal with predicting student selection, retention, drop-out, and group behavior tendencies and make recommendations for future students. However, other kinds of applications facilitate the direct teaching and learning process through personalization of content as per the needs of the students, chatbots, and any educational software, including AI techniques to enable learning. Although a lot has been promised in this domain but, little has been achieved (Zawacki-Richter et al., 2019).

2.3 Classification of AIED applications

Zawacki-Richter et al. (2019) have classified various AIED applications into four broad categories including, adaptive system and personalization, assessment and evaluation, profiling and prediction, and intelligent tutoring systems. In the AIED literature, some of the highly cited works are related to the implementation of virtual tutoring followed by the prediction of students' moods and behavior (Hinojo-Lucena et al., 2019). Chassignol et al. (2018) suggest that four major components of the educational process could be affected by AI. These components are content, teaching methods, assessment, and communication or interaction between instructor and students. Zhang and Aslan (2021) point out that these AI applications are facilitated by learning technologies such as chatbots, expert systems, intelligent tutors, machine learning, personalized learning environments, and visualizations.

Baker, Smith and Anissa (2019) have grouped the AIED tools into three broad categories, learner-facing, instructor-facing, and system-facing AIED.

For students:

The learner-facing AIED includes intelligent tutoring systems or personalized learning platforms that have the capabilities of curating the content as per students' needs, providing feedback, facilitating collaboration, and highlighting the strengths and weaknesses of the learners (Baker, Smith and Anissa, 2019). These systems may alleviate the 'one-size-fits-all' approach of traditional learning. These systems can be used in settings where students have mixed abilities and different learning needs, and where a single teacher is not able to address individual needs. They can engage in the learning process at their own pace. Additionally, students can use intelligent systems to familiarize themselves with basic concepts, which can be developed in traditional classrooms.

AIEd may facilitate varied interactions for learners, increase their engagement, generate adaptive learning materials, offer meta-cognitive prompts, provide enriched learning environments, and improve learning outcomes (Zhang and Aslan, 2021).

For instructors:

AI technologies can facilitate instructors by reducing their workload, providing valuable insights about students, and innovative tools for conducting teaching sessions (Baker, Smith and Anissa, 2019). These technologies may help the instructors save their time, which can be used for other aspects of learning. The targeted insights about the student's progress may help in addressing their needs effectively. The instructors can experiment with different aspects of their classroom, such as seating arrangements, assignments, learning materials, etc. by using AI-based tools. For educators, AIEd may help in identifying gifted or at-risk students, monitor the learning progress, and create personalized learning materials, assessments, and feedback (Zhang and Aslan, 2021). For instance, some of the AR and VR-

based tools may prove helpful in the classroom to enhance the level of understanding of complicated concepts. Another important aspect of the AIED for students is gamified learning. Both games and VR tools have been found to improve the learning outcomes of the students (Merchant et al., 2014). Baker, Smith, and Anissa (2019) suggest that it is neither possible nor desirable for AI technologies to replace the instructor in the classroom. Instead, the instructors should act as the orchestrators while using AIED tools.

For institution:

The institutional-level applications deal with predicting student selection, retention, drop-out, and group behavior tendencies and make recommendations for future students (Bates et al., 2020). For instance, Tsai et al. (2020) predicted students' dropout probability by employing various factors related to their backgrounds such as academic performance, number of absences, and number of alerted subjects. Such applications may help educational institutions in designing the appropriate interventions to assist students in course selection and enhancing their competencies so that the dropout rate can be reduced.

In the last decade, Artificial Intelligence in Education (AIEd) has emerged as a significant field of study and application in educational technology. However, despite such an early start, AI remained on the fringe until recently (Zawacki-Richter et al., 2019). The giant leap of recent years is primarily attributed to the availability of (big) data, easy computing access using Cloud computing, and advances in machine learning which is a part of AI (Pedró, 2019).

In recent times there has been significant development of the use of AI in higher education. Several Ed-Tech firms have come up with AI-based solutions that HEI can use. Examples like AdmitHub5 as a means of connecting with prospective and incoming students,

[5] https://www.admithub.com/press/accessed 15052021

Edulai6 to help monitor and measure the development of skills such as critical thinking, communication, collaboration, leadership, problem-solving, and interculturalism and many others are the subject of detailed study and future possibilities. They are acting as enablers to enrich teaching and learning and budding ground for future exploration of newer possibilities.

Artificial intelligence shows considerable potential to drive changes in how teaching and learning take place in colleges and universities, track student progress, and reduce the administrative work of a teacher in grading students. But AI tools also bring in biases based on the limitation of training data or algorithm constraints which academic institutions must understand and avoid.

The Indian scenario on AI usage in HEI is evolving. The government of India's policy-making think tank NITI Aayog, (National Institution for Transforming India) developed a National Strategy for Artificial Intelligence in 2018, showing government seriousness about this technology. Several AI-driven Ed-tech start-ups are facilitating this by partnering with educational institutions starting AI labs; the future of AI-driven services looks promising in India (Kumar, 2019).

2.4 Challenges related to the application of AI in higher education

Several challenges have also been noted while adopting AI in Higher education notably amongst them are preparing teachers for AI-ingrained education, ensuring inclusion and equity, availability of IT infrastructure, quality and inclusivity of data systems, and ethical and privacy concerns of collected data, amongst others (Pedró, 2019).

One of the significant challenges in the implementation of AI in the education sector is the teachers' reluctance to introduce AI in their teaching process (Girasa, 2020). The lack of willingness to take a risk and adopt innovations and the lack of resources for supporting the development of these applications play a crucial role in the visible lag of AI applications

[6] https://www.edulai.com/accessed 15052021

in higher education (Bates et al., 2020). Another challenge is the cost and time involved in developing and implementing the AIED, which would be difficult for institutions to afford.

There are apprehensions about algorithmic bias, loss of certain skills, and creativity owing to the over-reliance on AI solutions for learning (Luan et al., 2020). Therefore, it calls for appropriate human intervention in the learning process. The AI algorithms rely on the data, which may be unbalanced and contain better information about the general population of the students resulting in disadvantages for the minorities. On the other hand, AI applications in education promise personalized learning for students depending on their needs.

AI tools can also crunch masses of data and use advanced computing to interpret the results, in areas like enrollment, advising, and facilities (Zheng and Zhou, 2020). While there are ethical concerns, the higher education sector of AI applications related to teaching and learning is projected to grow significantly (Alexander et al., 2019). In recent times, some of the institutions, such as the Institute for Ethical AI in Education in the UK, have been established to devise the framework for ethical governance for AI in education.

2.5 Theories used in extant literature

A review of studies published in the top 3 journals related to education and technology revealed an apparent lack of theoretical advancement and application in the existing literature (Hew et al., 2019). A similar observation has been made regarding the use of theories in AI-driven educational technology (Zawacki-Richter et al., 2019). In order to identify the frequently used theories for AIED research, we reviewed the studies published in leading education technology-related journals as used by Hew et al. (2019) and reputed journals categorized under the FT50 list or A or A category of ABDC journal quality list. Because it is expected that the research published in these highly reputed journals must have theoretical implications.

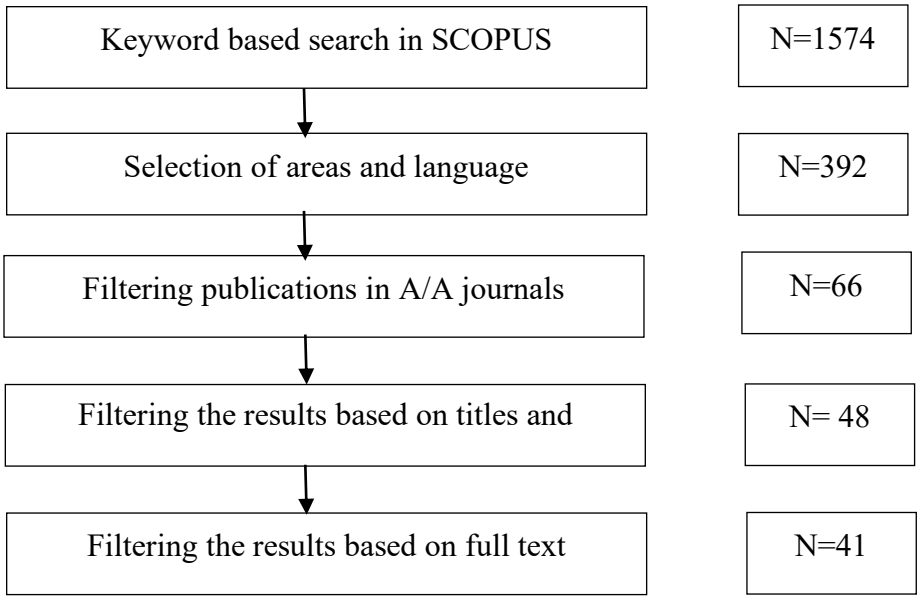


Figure 2.1: Flow of steps followed in literature review

Figure 2.1 represents the flow of steps followed in reviewing the relevant studies focusing on the artificial intelligence aspect in the education sector and theories prevalent in this domain. First, we performed a keyword-based search on Scopus, which is one of the most frequently used databases for academic research. The keywords used in this search include "artificial intelligence", "machine learning", "automated tutor", "intelligent agent", and "expert system", combined with education-related keywords such as "higher education". The search query resulted in 1574 records. We further limited the results to English language-related publications, focusing on areas of computer science, business and administration, and social sciences. As the primary focus of this review is to understand the theoretical standpoint of the studies, we have included the journal articles and hence excluded the conference proceedings and books. After applying all of these inclusion and exclusion criteria, we were left with 392 search results. Out of these records, we further filtered out the articles published in reputed journals, as mentioned earlier. This step led to a pool of 66 studies.

Each of these 66 studies was examined by first reading the titles and abstracts, which resulted in the exclusion of 18 studies not directly related to artificial intelligence in the

education sector. The full texts of the remaining 48 articles were read to understand the theories being used and the application of AI. This step led to the exclusion of 7 studies, which were either duplicates or artificial intelligence was not the area of focus. The remaining 41 studies are distributed over the year, as illustrated in Figure 2.2. The graph clearly indicates a surge in AI-related studies focusing on the education sector during the past 2 years.

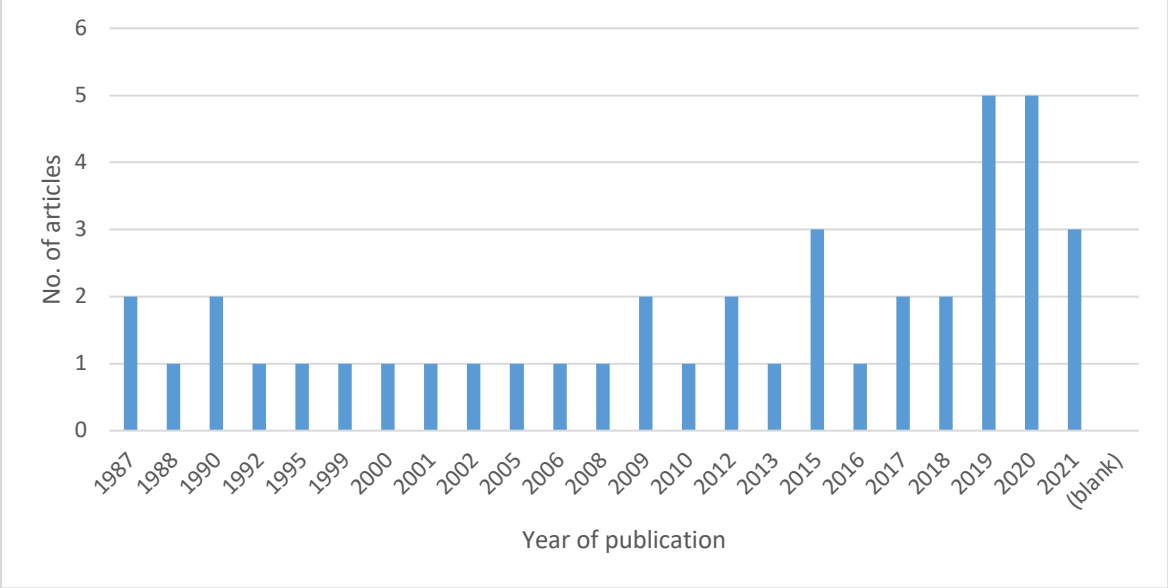


Figure 2.2: Year-wise distribution of selected studies

Out of 44 selected studies, only 13 studies have focused on one or more theoretical frameworks or theories. Some of the prominent theories used are the social constructivist theory, the Theory of Reasoned Action, the Self-determination Theory, and the Self-Regulation Theory. Other theoretical constructs discussed in the literature include cognitive styles, cognitive flexibility, and goal achievement. This limited application of theories indicates a lack of focus on the theoretical contribution aspect in the previous literature.

Further, we examined the objectives and findings of the studies to understand the major themes of discussion in the literature. Two broad themes of literature have been identified are prediction of students' performance and use of intelligent tutoring or expert systems. Eighteen studies have focused on various kinds of intelligent tutoring systems or

expert systems to enhance the learning experience. On the other hand, 13 studies have focused on different kinds of artificial intelligence and machine learning models used for predicting students' performance. These two themes cover around 75% of the articles reviewed in the current study. Additionally, the studies have also focused on other aspects of the learning process such as students' assessment, digital learning tools, and the role of social interactions among the students and with the instructors.

The AIED presents immense potential in the form of benefits such as inclusion and equity in education, and improved learning outcomes. However, there is a lack of understanding of different stakeholders' intentions to use this AIED and the various factors affecting their intentions. During the literature review, it was noted that there exists a literature gap on part of factors affecting behavioral aspects of stakeholders in adopting AI in higher education institutes. Also, the adoption of AI in the education sector is still in the initial phase in emerging countries, which presents immense scope for its application. India can be a good representation of emerging economies due to its vast diversity and size of the population. As per the literature review papers, there exist only six papers in the context of India. The present study's aim is to fulfill this research gap.

2.6 Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Readiness

From the studies of the literature review, we have seen that under identical data, the UTAUT Venkatesh et al. (2003) possesses better explanatory power compared to other theories or models. Here are four exogenous factors of the UTAUT model which are Performance Expectancy, Effort Expectancy, Facilitating Conditions, and Social Influence. The stakeholders in the present context are literate persons either the staff of institutes of higher education or the teachers the students or the researchers. They are not expected to be influenced by the societal impacts. Hence, in our consideration, we have dropped the construct

of Social Influence. We have considered its three other constructs. Moreover, the other main reason for selecting the UTAUT model is that this UTAUT model includes other eight existing models (Venkatesh et al., 2003). The integrated constructs of UTAUT have characterized those constructs utilized in earlier different models. It is, in this sense, considered as an all-inclusive model for synthesizing the acceptance attitude and behavior of the stakeholders for adopting AI (Carter and Bélanger, 2005). We have seen that attitude has been widely acknowledged in interpreting the intention of users for technology acceptance. We have taken this (Attitude) as a mediating factor (Chong, 2013). Attitude has been considered as a mediating variable between Performance Expectancy and Behavioural Intention; between Effort Expectancy and Behavioural Intention; between Effort Expectancy Behavioural Intention as has been done in several studies (Alshare and Lane, 2011; Cox, 2012). We have included a new construct, 'Perceived Risk' as an important exogenous variable as is also found in another study (Abu-Shanab and Pearson, 2009). The Facilitating Condition is proposed to have a direct linkage with Behavioural Intention as has been considered in another study (Venkatesh, Chan and Thong, 2012; Venkatesh, Thong and Xu, 2012). In this way, we theorized that Perceived Risk, Performance Expectancy, and Effort Expectancy have an impact on Behavioral Intention mediating through Attitude. Facilitating Conditions has been considered to have a direct impact on behavioral Intention. This would influence the adoption (Dwivedi et al., 2017). We have relied on the UTAUT model, but, we did not consider the moderators (age, gender, experience, and voluntariness) used in this model. This is because we are primarily interested in interpreting how the exogenous constructs are related to attitude and behavioral intention directly. We have not considered these moderators in the present context because it is expected that the attitude of the stakeholders would not be influenced by these moderators as all the stakeholders here are literate. We believe that we have been able to substantiate why we have chosen these

constructs like Perceived Risk (PR), Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Condition (FC), Attitude (ATT), and Behavioural Intention (BI) to interpret Adoption of AI in Higher Education (AAHE). Now, we will try to explain the constructs separately and develop the hypotheses and the model.

In order to examine the adoption of AI in the education sector, the current study proposes a model based on the integration of UTAUT (Venkatesh et al., 2003) and the Technology readiness index (Parasuraman, 2000). The UTAUT model consists of four core components affecting the intention to use a particular technology. These components are performance expectancy, effort expectancy, facilitating conditions, and social influence (Venkatesh et al., 2003). The UTAUT model has been extensively used in the extant literature to examine the adoption of AI technologies in various domains such as health (Zhai et al., 2021), library systems (Andrews, Ward and Yoon, 2021), disaster relief (Behl et al., 2021), etc. There has been a limited number of studies focusing on the adoption of AI in different domains of the education sector (Terblanche and Cilliers, 2020; Rico-Bautista et al., 2021; Chatterjee and Bhattacharjee, 2020; Gado et al., 2022). These studies have majorly used components of the UTAUT model; however, neither of the studies (mentioned in Table 2.1) has incorporated any moderating effects and individual characteristics of the users in the model. Therefore, the present research focuses on contributing to the existing literature by understanding the AI adoption by higher education stakeholders and moderating effects of various individual level characteristics.

Table 2.1. Studies related to AI adoption in the education sector

Authors	**Objective**	**Model used**	**Constructs used**

(Chatterjee and Bhattacharjee, 2020)	Examined the antecedents impacting the attitude of stakeholders of HEIs towards AI adoption	UTAUT	Performance expectancy, effort expectancy, facilitating conditions, perceived risk
(Terblanche and Cilliers, 2020)	Examined factors affecting acceptance of AI chatbot for coaching	UTAUT	Performance expectancy, effort expectancy, facilitating conditions, perceived risk, social influence
(Gado *et al.*, 2022)	Examined factors affecting AI acceptance by psychology students	UTAUT, TAM	Perceived usefulness, perceived ease of use, perceived social norms
(Rico-Bautista *et al.*, 2021)	Proposed an AI adoption model for universities	TAM	Ease of use, perceived utility, voluntariness

2.6.1 Performance Expectancy (PE)

PE is defined as 'the degree to which an individual believes that using the system will help him attain gains in job performance' (Venkatesh et al., 2003). PE has been widely studied in the case of the adoption of various technologies such as blockchain (Queiroz et al., 2021), cryptocurrency, etc. In the current study, the PE focuses on the belief of students and instructors that the use of AI in the education process will contribute to better performance and educational outcomes. The PE of AI in education institutions positively influences the behavioral intention to use.

2.6.2 Effort Expectancy (EE)

EE has been defined as the "degree of ease associated with consumers' use of technology" (Venkatesh et al., 2003). When users experience the ease of use and need much less effort to learn the technology, they are more likely to adopt it. In the context of AIED, effort expectancy is the degree of ease associated with the use of AI-based tools in education. Hence, effort expectancy pertaining to AI application in educational institutions has a positive influence on behavioral intention to adopt AIED.

2.6.3 Social influence (SI)

SI is the extent to which the individual perceives that their significant others such as friends, and family members, believe that they should use a certain technology (Venkatesh et al., 2003). In other words, users care about what their peers or social groups think about using a certain technology. The previous study focusing on the adoption of chatbots has found a significant impact of social influence on an individual's intention to use (Terblanche and Cilliers, 2020). As chatbot is an AI application only, we hypothesize a similar relationship between SI and intention to use for other AIED applications. In other words, we hypothesize that SI positively influences the intention to use AIED by different stakeholders.

2.6.4 Facilitating conditions (FC)

FC refers to consumers' perception of the availability of resources and support required to perform certain behaviors (Venkatesh et al., 2003). The usage of AI relies heavily on support in terms of resources, training, and infrastructure (Cox, 2021). In the case of AIED, it refers to the support and resources required to use AI in the education or learning process. The availability of such support improves an individual's intention to use AIED. Hence, we hypothesize that facilitating conditions regarding AIED positively influence the intention to use AIED.

2.6.5 Moderators

Venkatesh, Thong and Xu (2016) suggest that individual characteristics should be introduced as the moderators of the relationships between the four components of UTAUT and the behavior intention to use a particular technology. Further, Dwivedi et al. (2019) have argued that UTAUT integrates the technology and context-related attributes in the model, missing a key element of "individual characteristics" of users engaging with the technology. In the case of a new technology, the readiness of people towards that technology may serve as an important moderating factor. When the penetration of a new technology increases, it may lead to the emergence of various positive and negative views among the potential adopters. In the case of AIED as well, the low penetration rate of intelligent tutoring systems and lower amount of enthusiasm of faculty towards its use (Wang et al., 2020). In order to accommodate a range of views ranging from being highly ready to highly resistant towards technology, a term called Technology readiness was coined.

2.7 Technology readiness

Technology readiness has been defined by Parasuraman (2000) as "people's propensity to embrace and use new technologies for accomplishing goals in home life and at work" (p. 308). Four major components of technology readiness are optimism, innovativeness, discomfort, and insecurity. The first two are the drivers of technology readiness while the discomfort and insecurity are the inhibitors. We expect the respondents with high or low TR to differ in their beliefs-intention relationships. Hence, technology readiness has been proposed to moderate the relationship between UTAUT variables and behavior intention to use AIED.

2.8 Knowledge of AI

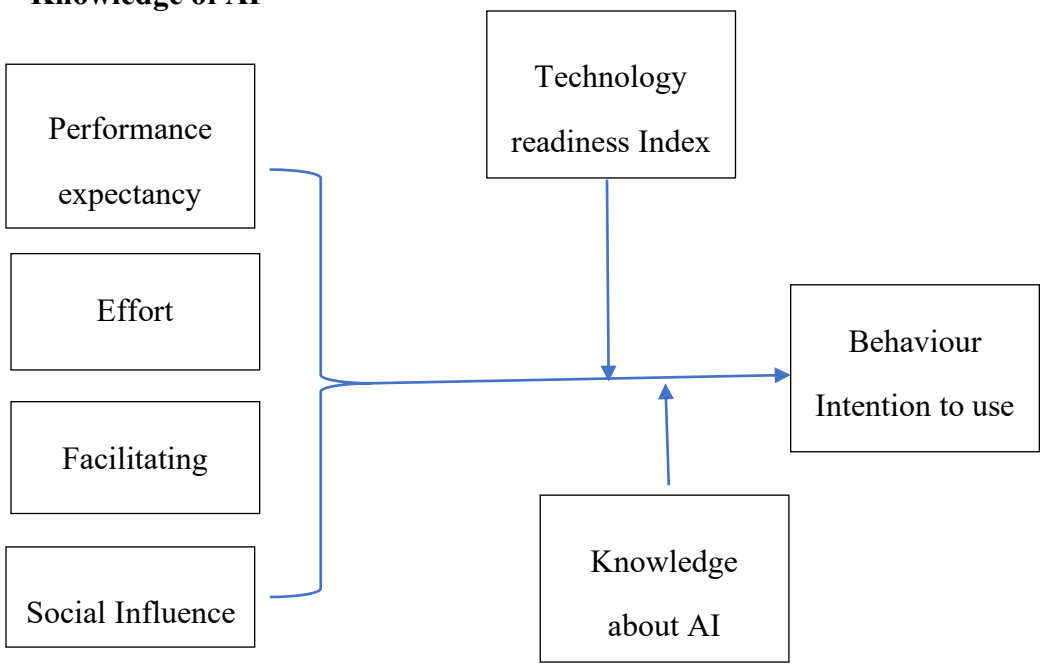


Figure 2.3: Conceptual model

At an early stage of experiencing AI, an individual depends more on the social influence and facilitating conditions to impact their intentions to adopt the technology. However, at the later stage of experience, people depend more on the instrumental support gained through knowledge of AI, hence, the impact of these determinants decreases with an increase in relevant experience (Venkatesh et al., 2003; V. Venkatesh, Thong and Xu, 2012). As AI in the education sector is relatively new, fewer people are likely to have direct experience of using it. Therefore, we have used the knowledge about the AI field in general as a proxy for the same. Hence, we hypothesize that,

Knowledge about AI negatively moderates the relationship between social influence and behavioral intention to use AIED.

The previous studies point out that the relationship between effort expectancy and intention to use technology is significant during the initial periods of adopting a new technology. However, as the knowledge and experience with the technology increases over

time, the strength of this relationship weakens (Venkatesh et al., 2003; Venkatesh, Thong, and Xu, 2012). A similar relationship has been proposed in the case of AI-based tools in the operations management domain (Venkatesh, 2022). People having no or very little knowledge about AI are expected to put greater effort into utilizing the technology, which entails a stronger relationship between EE and intention to use.

Hence, we hypothesize that,

Knowledge about AI positively moderates the relationship between effort expectancy and behavior intention to use AIED.

Theory of Reasoned Action Since the 1960s, a behavioral theory known as the Theory of Reasoned Action (TRA) has been developed. According to this theory, a person's intention to engage in a behavior determines that action, which is then impacted by that person's attitude toward the behavior and the subjective norms that surround it.

Within the realm of artificial intelligence (AI) in higher education, the Theory of Reasoned Action (TRA) can offer a valuable framework for comprehending and forecasting the acceptance and utilization of AI technologies.

Perception of AI in Higher Education: Attitude pertains to an individual's favorable or unfavorable assessment of engaging in a specific behavior. In this instance, it pertains to the perspectives of educators and students toward the utilization of AI in higher education[7]. Studies have demonstrated that artificial intelligence (AI) has the capacity to improve the quality of teaching and learning, offer customized feedback, and streamline administrative duties. Nevertheless, there are also apprehensions around privacy, fairness, and the

[7] 1. Artificial intelligence in higher education: the state of the field .... https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-023-00392-8.
2. The Impact of Artificial Intelligence on Higher Education: An Empirical .... https://files.eric.ed.gov/fulltext/EJ1384682.pdf.

disparity in access to digital resources. Comprehending these views can aid in forecasting persons' inclination to utilize AI and their potential utilization patterns.

Perceptions and Social Influences Regarding AI in Higher Education: Subjective norms pertain to an individual's judgment of whether significant individuals in their life believe they should engage in a specific behavior. In this instance, it pertains to the perceived societal expectation to utilize artificial intelligence in the realm of higher education. This feedback could originate from peers, administrators, lawmakers, and society as a whole. Gaining insight into these established standards can facilitate the anticipation of the inclination to utilize artificial intelligence and provide guidance for implementing measures to encourage its acceptance and implementation.

Utilization of Artificial Intelligence in Higher Education: According to TRA, the major determinant of a self-generated behavior is the perceived intention to perform the conduct. In this case, it encompasses the intentional incorporation of artificial intelligence in regards to postsecondary education[3]. Thus, assuming correct comprehension of attitudes and subjective norms, we might predict this desire and, therefore, the practical adoption of AI. The Theory of Reasoned Action (TRA) only seems to offer the most concise model to understand and predict the usage of Artificial Intelligence (AI) in the higher education context. The study of attitudes, subjective norms, and intention can provide a useful understanding of those elements that motivate acceptance and use of AI. This understanding can be used to inform the creation of policies and practices to deliver AI for the effective and equitable use of AI.

2.9 Human Society Theory and its Implication with AIED

The concept of "Human Society Theory" is broad and encompasses various sociological theories, such as those proposed by Karl Marx, Emile Durkheim, and Thomas Hobbes[5689]. These ideas seek to elucidate the genesis, composition, and development of

human communities. They perceive society as an intricate system comprised of interconnected components, such as social institutions and education.

The utilization of Artificial Intelligence (AI) in education has been progressively expanding, presenting both advantageous opportunities and complex obstacles[1234]. Comprehending the theory of Human Society can offer useful perspectives on the efficient integration of AI into education.

Artificial Intelligence and its Impact on the Social Structure of Education

The theory of Human Society generally highlights the significance of social structures, including educational institutions[9]. Artificial intelligence can be employed to augment these structures. AI can automate administrative activities, allowing instructors to dedicate their attention to teaching[134]. AI can customize learning experiences, tailoring them to the specific needs of each unique student.

Nevertheless, This means that for the industrial applications of AI technologies, there is a need to avoid replicating the inequalities in the socioeconomic fabric. For instance, the student-centered approaches can lack Artificial Intelligence technologies, and the lack can worsen the education disparities. Therefore, the quest to fulfill the opportunity of AI in the field of education has to be aimed at achieving a fair and sustainable balance.

AI, Society, and Individual

It also analyzes and explores how society relates to the person according to the theory of Human Society. While considering the role of AI in the sphere of education, one should discuss the impacts of AI on learners.

Intelligent agents are one way to improve learning for learners by providing personal feedback and adaptive assessments. However, there are also inherent risks involved in devising optimal solutions. One main disadvantage of relying too much on AI is that

students can become isolated from people, and social interaction is a critical activity in every learning process.

The future of artificial intelligence (AI) in education

Therefore, potential strengths and weaknesses, as well as opportunities and threats, should be managed to achieve the best results in the future, dealing with the interaction between AI and Human Society Theory. This implies the ongoing discussion of ideas among educators, researchers, and policymakers.

Likewise, education should also seek to increase students' understanding of AI. Besides, this enables students to gain the competencies that will be expected of them in the age of Artificial Intelligence and engage in active discussions about AI applications.

In sum, it is useful to refer to Human Society Theory as far as the application of AI in the learning process is concerned. Thus, by understanding the societal and personal dimensions of education, it is possible to strengthen the educational process with the help of artificial intelligence while preserving fairness and balanced interaction with technology.

2.10 Summary

The given document is focused on describing the implementation of artificial intelligence in the system of higher education and its consequences in the social aspect. This work deals with the Theory of Reasoned Action and the theory of Human Society as theories in realizing and predicting the acceptance and use of AI in Learning. On a final note, the document underlines a need to be attentive to society and people's liberties and to act fairly within dealing with technology when trying to incorporate AI into the education process.

This – notion is explained by the Theory of Reasoned Action which serves as a theoretical tool for predicting the adoption and use of technology in learning contexts as well as in general.

The theory of Human Society can provide insights into the use of AI in education, namely, the importance of social factors and the ethical principle of fairness in making AI systems open to everyone.

When it comes to applying AI in education, the individual approach has a chance to be reached based on the individual feedback/methods of evaluations; nevertheless, one should always be careful not to be fully dependent on the AI systems while staying involved with it as an educational process itself.

For these reasons, to enhance the positive effects and diminish the negative consequences of adopting different structures and approaches, ongoing dialogue among teachers, scholars, and policymakers is required, as well as a preoccupation with enhancing students.

CHAPTER III:

METHODOLOGY

3.1 Overview of the Research Problem

The Indian higher education system suffers from various issues such as inflexible academic structure, uneven capacity across subjects, and lack of autonomy (Menon et al., 2014). Challenges such as low employability of graduates, poor quality of teaching, and lack of universal inclusivity of higher education exist in Indian HEI (Khare, 2018). Despite its rapid growth, higher education in India has not scaled to the same levels of quality as its world peers. The investment in the latest technologies and ensuring its proper implementation holds the potential to resolve some of the problems plaguing the system (Menon et al., 2014). AIED presents an opportunity for Indian HEI to meet the Ministry of Human Resource Development's target of achieving 32% GER by 2022 from currently 26.3% (2018-19) and 50% by 2030. Indian Government also intends to add approximately 35 million more seats in higher education8. Therefore, it is necessary to investigate how AI would help teachers enrich their teaching and reduce their administrative load, simultaneously how AI can help improve student's learning outcomes, which should be more personalized, making them more employable.

Higher education institutes today face enormous challenges, the significant ones being disengaged and distracted students (Fulford, 2017), the increasing ineffectiveness of traditional one-way instruction (Barkley and Major, 2018) due to large classroom size, faculty overloaded with administrative work (Ylijoki and Ursin, 2013) amongst the others. Using big data analytics and artificial intelligence, students can access personalized learning experiences, which may address some of these challenges. The AI applications provide

[8] (https://pib.gov.in/PressReleasePage.aspx?PRID=1642061**).**

opportunities to realize the students' personalized learning needs and help enhance the efficiency of educators. Therefore, the future development of the education sector will be closely related to the development of AI. In other words, the development of novel technologies and intelligent machines will stimulate future education (Chen et al., 2020). The benefits of this technology cannot be realized unless the students, educators, and administrative staff of higher education institutions adopt the AI application.

Although the research on AI in the education sector has gained scholarly attention, there is little focus on the adoption of AI technologies in higher education. Existing studies focus on discussing the opportunities and challenges existing in the domain, and emerging trends (Chassignol et al., 2018), providing recommendations for implementing AIED in different teaching and learning settings (Hwang et al., 2020). Very few studies directly focus on the adoption of AI adoption in HE in India (Chatterjee and Bhattacharjee, 2020). This study aims to discover how various participants would be able to adopt AI in education and the role of individual-level characteristics in this process.

3.2 Operationalization of Theoretical Constructs

The process of operationalizing theoretical constructs is a vital stage in the development of research. Conceptual clarification is the act of precisely describing a vague concept in order to make it easily recognisable or quantifiable. It entails the creation of precise and tangible measurement processes (indicators or objects) that enable researchers to empirically quantify a construct.

Operationalisation helps classify a theory concept into a real and manageable situation, enabling its study through real observations. However, it is worth noting that even if inaccurate predictions of statistical methods that result in the overestimation of true positives have been prevented, the potential exists for making wrong conclusions when equating findings to theory.

Still, when it comes to the operationalisation step, it must be taken into account that there are numerous ways to define the measurement of the variables and to elaborate a method to capture the construct in the most direct way. This technique is very vital in ensuring the credibility of the research results in the current study.

3.3 Research Purpose and Questions

Defining a research purpose and inquiries for a study on AI for higher learning means identifying the main areas to analyse, defining aims of research, and identifying the questions the research attempts to answer. The objective of this study was to comprehend the present condition and prospective uses of artificial intelligence in higher education.

This study aims to investigate the influence of artificial intelligence on teaching, learning, and administrative procedures in higher education institutions in Indian Context specifically.

- What are the current applications of AI in higher education?
- What are the advantages and difficulties that are commonly recognised while utilising AI in educational instruction and learning procedures?
- What impact does the utilisation of artificial intelligence in higher education have on student achievements?
- What are the prospective future implementations of artificial intelligence in higher education?

3.4 Research Design

Measurement development:

The quantitative survey methodology was deemed appropriate for the current study as validated scales of the latent construct are available in the literature. The proposed model of the current study consists of seven constructs, and their indicators have been adapted from the

previous research. For performance expectancy, effort expectancy, social influence, and facilitating conditions constructs, the indicators have been adapted from (Venkatesh et al., (2003); Wang et al., (2020); Park, Hong, and TPM Le (2021). The technology readiness index indicators have been adapted from (Parasuraman and Colby, 2015; Flavián, Ibáñez-Sánchez and Orús, 2021), which are composed of four sub-factors, optimism, innovativeness, discomfort, and insecurity. The knowledge about AI scale has been adapted from (Venkatesh, 2022). A seven-point Likert scale anchored from strongly disagree (1) to strongly agree (7) would be employed for measuring each item corresponding to these constructs. Additionally, the demographic information of the participants, including gender, age, and education, would be collected.

Joseph F. Hair, (2009) Recommend that the content of questions should be validated by the experts. Therefore, to validate the appropriateness and clarity of the content of these items, a pre-test would be conducted with the help of a few professors and Ph.D. scholars. Further, the measurement instrument would be pilot-tested with approximately 20-30 students. The complete list of measurement items is shown in Appendix 1. The self-administered questionnaire is developed to collect the data through an online survey. The distribution of the questionnaire through electronic means allows a wider reach at a relatively low cost.

3.5 Population and Sample

The data was collected from 200 respondents.

3.6 Participant Selection

Participants of the study were selected from 5 different segments distributed across three higher educational institutions, a professional group of AI users, and Ed-Tech companies and service providers.

3.7 Instrumentation

A questionnaire was developed to ascertain responses as shown in Appendix B

3.8 Data Collection Procedures

Data collection and target population:

The current study focuses on the adoption of AIED in higher education in India. Therefore, we will take responses from renowned higher education institutions in India. The students are one of the primary stakeholders of the education system. Therefore, they are the target population for the current investigation. However, focusing on students of a single institution will affect the generalizability of the results. Therefore, the responses would be collected from two or three higher education institutions. As it is pertinent to approach the respondents who are aware of the artificial intelligence applications, the survey will include a question related to awareness of Artificial Intelligence to check the eligibility of the respondents.

3.9 Data Analysis

Structural Equation Modelling (SEM), a second-generation statistical analysis method, will be used to analyse the survey responses. This method allows the testing of the relationship between observed and latent variables simultaneously by combining multiple regression with factor analysis and providing overall model fit indices. It is able to take measurement errors of the observed variables into account (Iacobucci, 2009). SEM has been used as a preferred technique in IT/IS adoption literature. The analysis will be performed in two phases. First, the measurement model would be evaluated for internal consistency and reliability of the measures. The second step would be the evaluation of the structural model to check the relationship between exogenous and endogenous variables of the proposed model.

Common method bias:

There is a probability of common method bias as the questionnaire has been employed to collect data for both independent and dependent constructs from a single source. The CMB may lead to increased association among the measured variables (Podsakoff and Organ, 1986). Harman's single-factor test was used to investigate the CMB. The test results entail that the single factor explained only 32.07% of the total variance, which is less than the recommended threshold of 50% indicating that there is no CMB issue.

Measurement model:

Structural equation modelling has been used to investigate the proposed model by computing the measurement and structural models. Confirmatory factor analysis (CFA) was employed to evaluate how well the data fit the measurement model. The AMOS 22 software was adopted to carry out the analysis. The maximum likelihood method was performed for model estimation, where the correlation matrix was used as an input. Various model fit indices such as chi-square value normalised by degrees of freedom ($\chi 2$/df), and comparative fit index (CFI) were employed to examine the goodness of fit. For the present model, $\chi 2$/df value is 1.46, which is well between the recommended range of 1 to 3 and the CFI value is 0.961 suggesting the excellent model fit. Other fit indices such as SRMR and RMSEA were less than the recommended threshold of 0.08 and 0.06 respectively. The value of PClose=0.453 also suggests an excellent model fit.

Table 3.1. Model fit measures

Measure	Estimate	Threshold	Interpretation
CMIN	392.896	--	--
DF	268	--	--
CMIN/DF	1.466	Between 1 and 3	Excellent

CFI	0.961	>0.95	Excellent
SRMR	0.052	<0.08	Excellent
RMSEA	0.051	<0.06	Excellent
PClose	0.453	>0.05	Excellent

	CR	**AVE**	**MSV**	**MaxR(H)**	**FC**	**PE**	**BI**	**TRIn**	**TRD**	**TRO**	**PRIV**	**TRI**
FC	0.924	0.710	0.326	0.929	**0.843**							
PE	0.931	0.731	0.326	0.939	0.571	**0.855**						
BI	0.921	0.746	0.458	0.945	0.292	0.511	**0.863**					
TRIn	0.732	0.513	0.242	0.596	0.163	0.218	0.200	**0.716**				
TRD	0.754	0.501	0.233	0.763	0.252	0.107	0.114	0.483	**0.708**			
TRO	0.761	0.531	0.458	0.712	0.269	0.498	0.677	0.197	0.160	**0.728**		
PRIV	0.934	0.825	0.242	0.942	0.099	0.046	0.075	0.492	0.306	0.042	**0.908**	
TRI	0.714	0.555	0.440	0.718	0.197	0.303	0.585	0.210	0.426	0.663	0.193	**0.745**

Further, the reliability and convergent and discriminant validity of the measurement model were investigated. First, the composite reliability and Cronbach's alpha have been used to evaluate the reliability. Then the item reliability was evaluated by using the values of item loadings on constructs. Table 3.1 illustrates that the values of the composite reliability measure are above the suggested level of 0.70, implying adequate internal consistency. The minimum CR and alpha values are 0.694 and 0.714 respectively. The average variance extracted (AVE) values were used to examine the convergent validity. The AVE values for all the constructs are greater than the recommended threshold of 0.50, which establishes adequate convergent validity. Further, the AVE value of each construct is greater than its

squared correlation with other constructs establishing the discriminant validity of the measurement model.

3.10 Research Design Limitations

Artificial Intelligence is an ever-evolving discipline. Newer developments lead to new opportunities and newer challenges. The research was conducted during a specific period from March to Aug 2022. It does not cover all the possibilities and challenges arising out of new developments of AI in education.

3.11 Conclusion

AI solutions have opened a new vista of teaching opportunities, learning as well as administrative work in institutes of higher education. This study will explore the possibilities of embracing AI in higher education in India which is still in the initial stage. The study will provide a model identifying the determinants that would help and accelerate the adoption of AI in higher education. The applications of AI in the higher education system would easily enrich the stakeholders of higher educational institutes to expand HEI richness and reach to benefit a very large section of the underserved population in India who get left out due to paucity of resources and affordability.

CHAPTER IV:

RESULTS

This chapter discusses the use of AI in education, specifically focusing on applications such as personalized tutoring, virtual tutors, chatbots, content designing, and grading systems. The survey was conducted to gather opinions on these AI applications from individuals affiliated with educational institutions.

4.1 Survey Response Summary:

4.1.1 Performance Expectancy

Table 4.1: Performance Expectancy

		Strongly disagree	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly agree**	**Total**
Using AI enables me to accomplish my learning activities more efficiently and effectively	**Frequency**	6	3	8	17	50	82	36	202
	Percent	3	1.5	4	8.4	24.8	40.6	17.8	100
Using AI saves my time and reduces costs in learning activities	**Frequency**	5	4	3	23	40	84	43	202
	Percent	2.5	2	1.5	11.4	19.8	41.6	21.3	100
Using AI increases the	**Frequency**	6	5	4	21	47	79	40	202
	Percent	3	2.5	2	10.4	23.3	39.1	19.8	100

quality of my work in learning activities									
Using the AI system increases my productivity in learning activities.	**Frequency**	7	4	7	22	43	84	35	202
	Percent	3.5	2	3.5	10.9	21.3	41.6	17.3	100

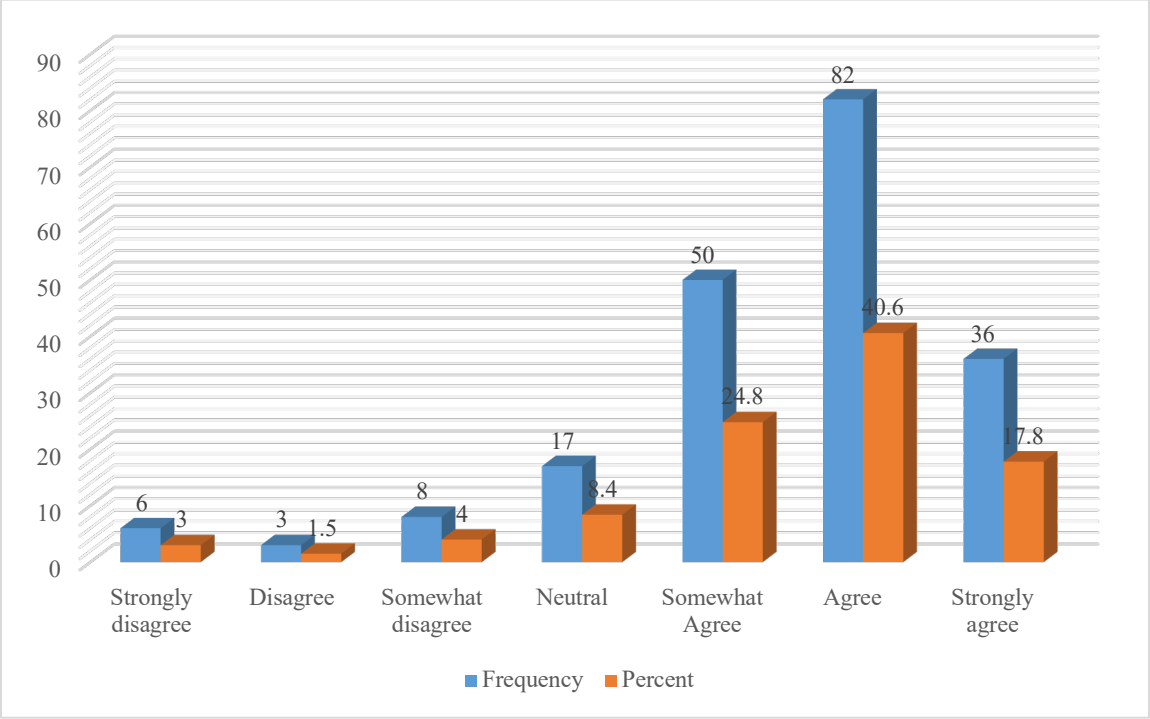


Figure 4.1: I can complete my learning tasks more quickly and successfully when I use AI.

As can be seen in above figure 4.1, the popular of respondents believe that AI enhances their learning efficiency and effectiveness. However, a small fraction 3% strongly disagree, 1.5% disagree, and 4.0% somewhat disagree. A moderate number are 8.4% neutral, while

24.8% somewhat agree. The largest group, 40.6%, agrees, while 17.8% strongly agree. The majority of respondents believe that AI significantly improves their learning activities' efficiency and effectiveness.

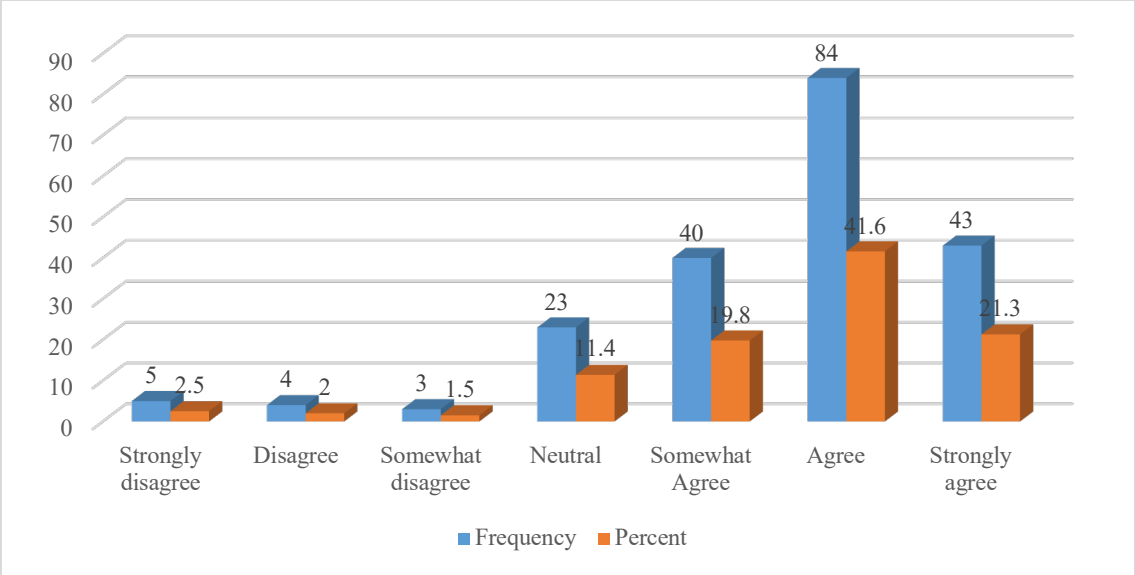


Figure 4.2: AI helps me study faster and spend less money on educational activities.

The above figure 4.2 shows respondents' views on AI's effectiveness in saving time and reducing costs in learning activities. With 2.5%strongly disagree and 2% disagree and 1.5% somewhat disagree, A moderate number is 11.4% neutral, while a significant portion of respondents 19.8% somewhat agree. The largest group, 41.6%, strongly agree, while a substantial number, 21.3%, strongly agree. The majority of respondents are positive about AI's potential to save time and reduce costs in learning activities.

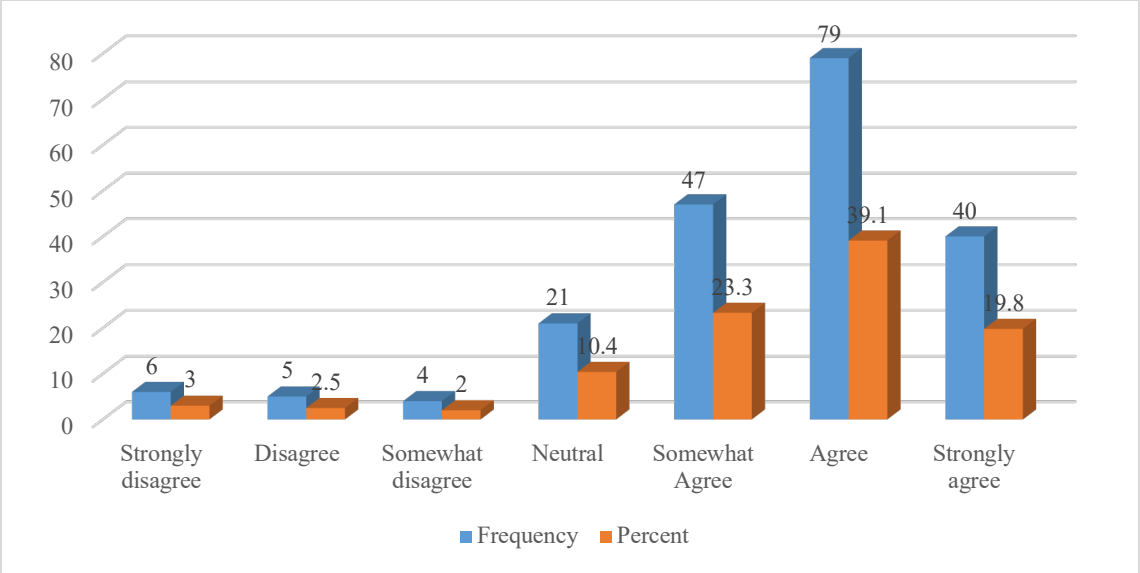


Figure 4.3: Using AI improves the calibre of my learning activities work.

As can be seen in the above figure 4.3, a survey of 202 respondents revealed that a majority of them believe that AI enhances the quality of their work in learning activities. A total of 58.9% of respondents agree, while 23.3% somewhat agree. However, a small minority, 3.0% strongly disagree, 2.5% disagree, and 2.0% somewhat disagree, making 7.5% of respondents not believe AI improves work quality.

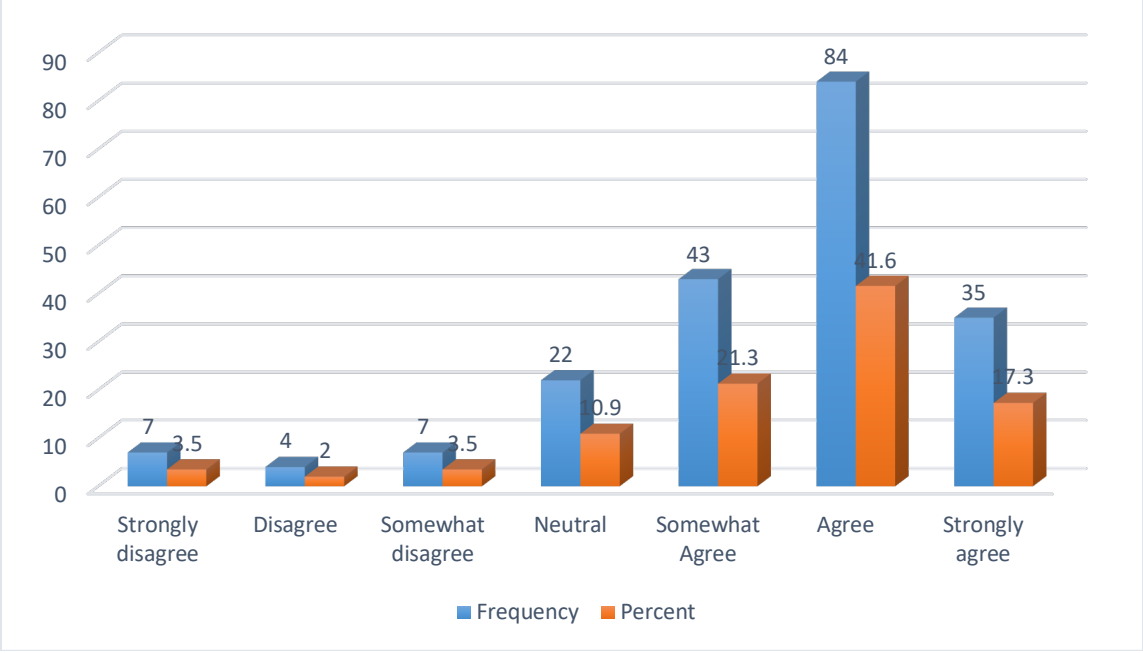


Figure 4.4: Using the AI system increases my productivity in learning activities.

According to the poll results in above figure 4.4, most respondents believe that employing AI technologies will increase their efficiency when learning. To varied degrees, the majority (80.2%) agree that AI increases productivity; 17.3% strongly agree, and 41.6% agree. This demonstrates that the majority of participants are conscious of and grateful for AI's benefits to productivity. However, just 9.0% of people disagree, with 3.5% strongly disagreeing and another 3.5% disagreeing moderately, suggesting considerable scepticism. Furthermore, 10.9% of respondents express no opinion, which reflects some ambiguity or disinterest. The data, taken as a whole, shows a generally optimistic picture of AI's potential to increase productivity in educational settings.

4.1.2 Effort Expectancy

Table 4.2: Effort Expectancy

		Strongly disagree	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly agree**	**Total**
It is easy for me to become skilful at AI technologies in learning activities	**Frequency**	5	6	12	35	49	57	38	202
	Percent	2.5	3	5.9	17.3	24.3	28.2	18.8	100
The AI technology would be simple for me to use in my educational endeavours.	**Frequency**	5	5	11	24	50	74	33	202
	Percent	2.5	2.5	5.4	11.9	24.8	36.6	16.3	100
It is easy for my organization to migrate to AI	**Frequency**	11	19	23	44	41	49	15	202
	Percent	5.4	9.4	11.4	21.8	20.3	24.3	7.4	100
Management support is	**Frequency**	6	3	3	13	32	66	79	202
	Percent	3	1.5	1.5	6.4	15.8	32.7	39.1	100

important for the implementation of AI									
Investment cost is a primary concern for my organization to consider AI	**Frequency**	12	13	18	34	44	51	30	202
	Percent	5.9	6.4	8.9	16.8	21.8	25.2	14.9	100

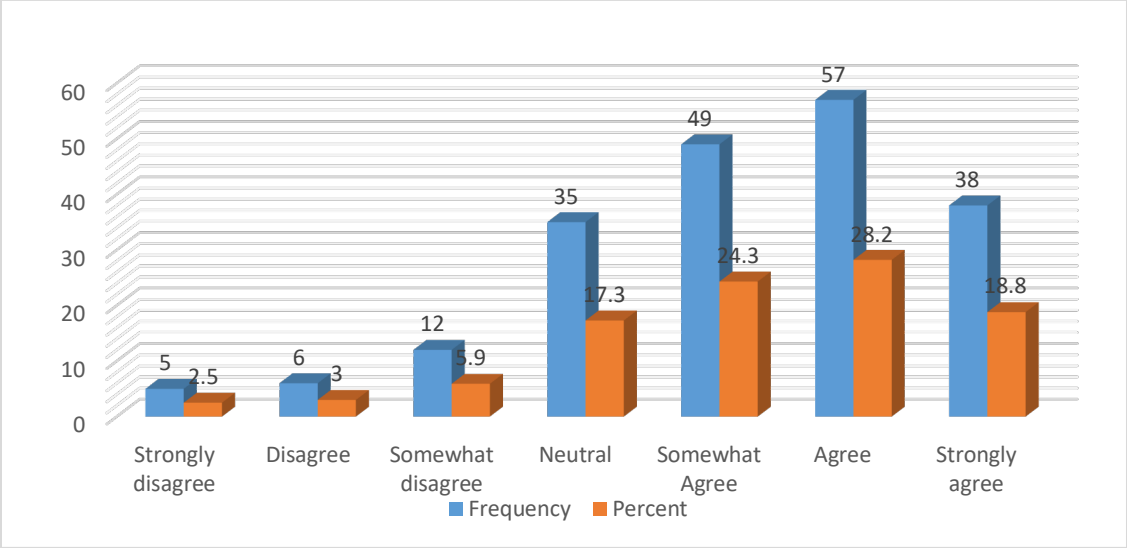


Figure 4.5: I can easily pick up the skills I need to use AI in learning activities.

The above figure 4.5 shows a wide range of perspectives on the ease with which AI technology can be learned through educational activities. While a sizable majority of respondents (71.3%) believe they can become skilled in AI through learning, a significant percentage (11.4%) are doubtful, either agreeing or strongly disagreeing with the assertion. Furthermore, a sizable proportion of respondents (17.3%) are neutral, indicating a lack of strong conviction either way.

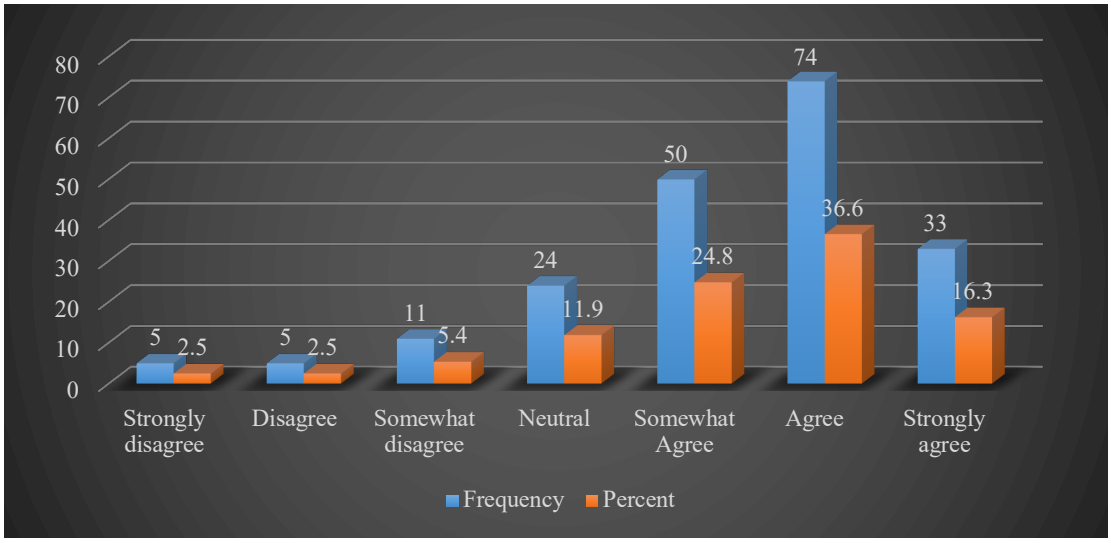


Figure 4.6: The AI technology would be simple for me to use in my educational endeavours.

The above figure 4.6 reveals people's impressions of the usability of AI systems for learning activities. While a sizable majority (53.1%) are confident in the simplicity of use of such technologies, a sizable minority (21.9%) disagree or are undecided on the subject. However, it is worth mentioning that a sizable proportion (24.8%) continue to hold fairly positive views, demonstrating some level of openness or optimism about using AI in their learning attempts.

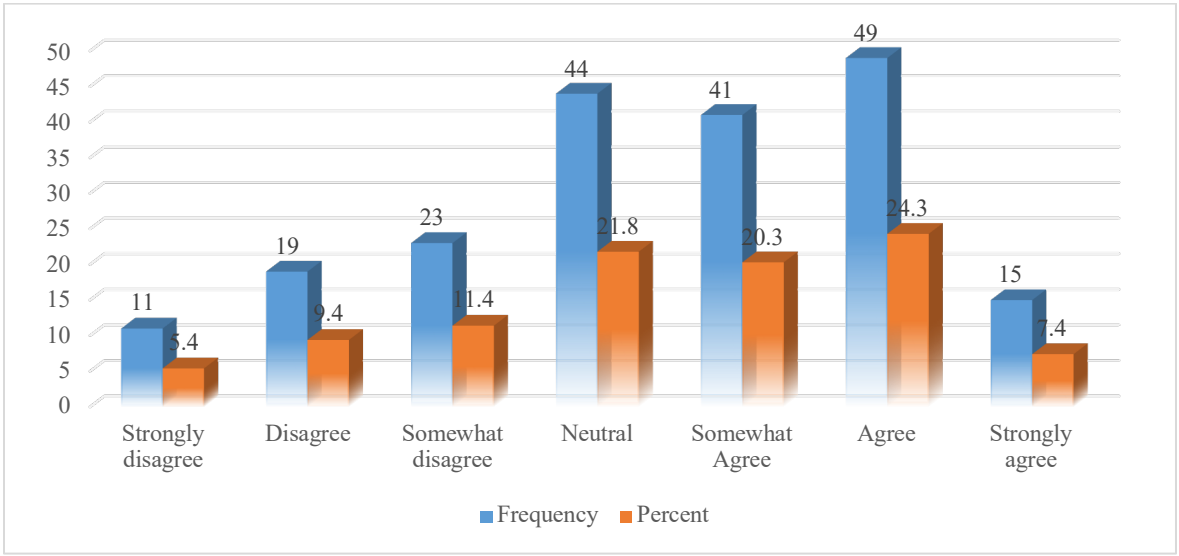


Figure 4.7: It is easy for my organization to migrate to AI

The survey data illustrated in above figure 4.7 reveals that a significant portion of respondents 26.2% (5.4% strongly disagree, 9.4% disagree, and 11.4% somewhat agree) are sceptical about the ease of AI migration within their organizations, indicating potential challenges. However, the majority 51.9% (24.3% agree, 7.4% strongly agree, and 20.3% somewhat agree and believe their organizations can easily transition to AI, indicating confidence in their adaptability. A significant portion (21.8%) remain neutral, indicating the need for further assessment and evaluation of the implications and readiness factors for this significant technological shift.

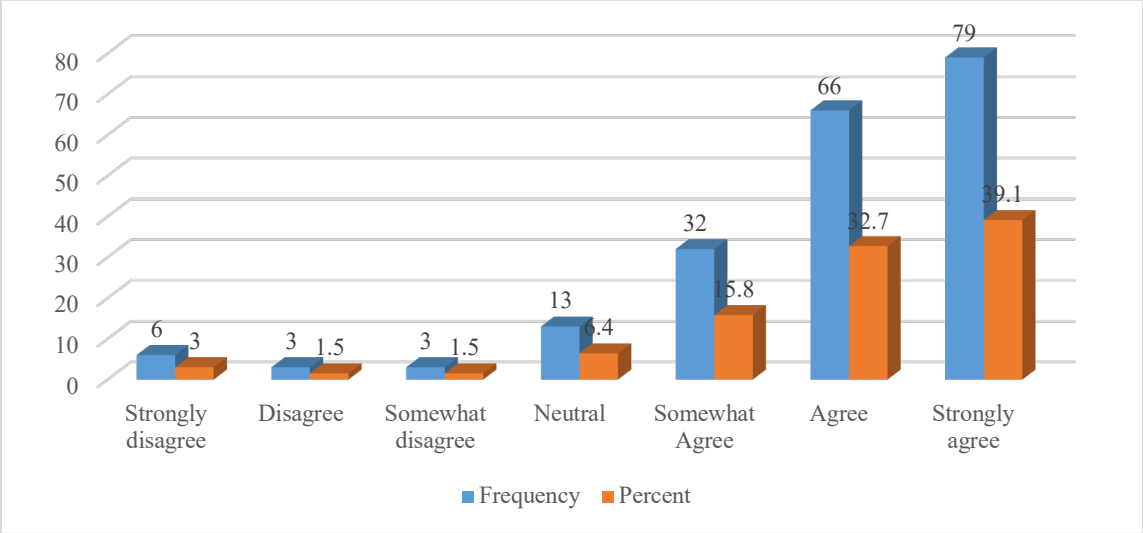


Figure 4.8: Management support is important for the implementation of AI

The above figure 4.8 shows overwhelming agreement among respondents, with 71.8% (39.1%strongly agree, 32.7%agree) expressing strong agreement and another 32.7% merely agreeing, for a total of 72.5% believing that management support is critical for effective AI implementation. In contrast, just a small minority 6% (3.0% disagree strongly, 1.5% disagree, and 1.5% disagree somewhat.) either disagrees or is ambivalent on the importance of managerial backing.

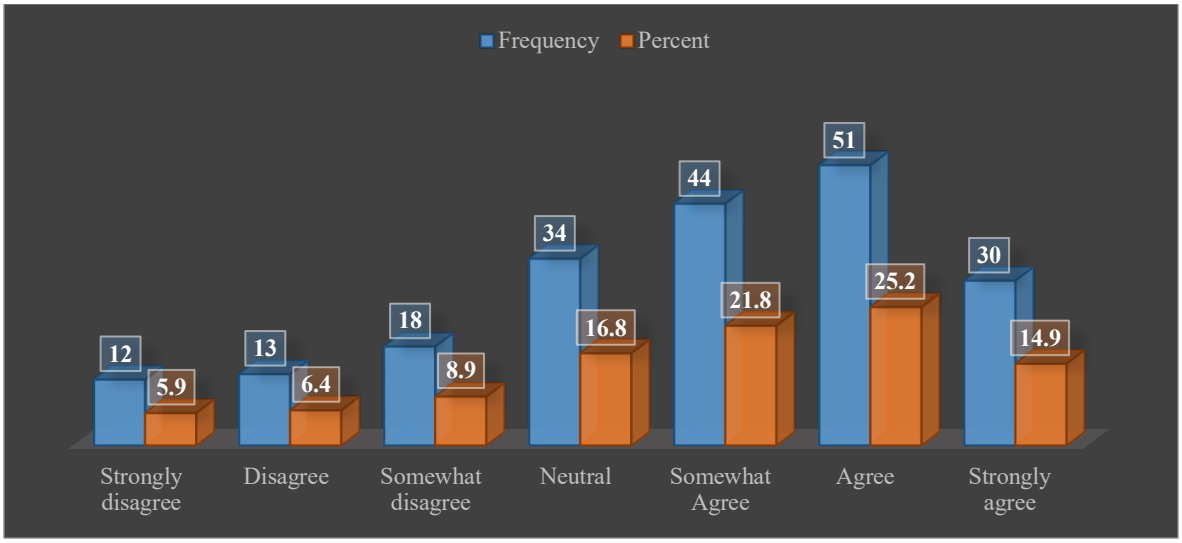


Figure 4.9: For my organisation, the cost of investment is the main factor when considering AI.

The above Figure 4.9 survey shows that investment cost is a major concern for many organizations considering AI adoption. A majority 61.9% (14.9% strongly agree, 25.2% agree, and 21.8% somewhat agree) agree that cost is a significant factor, suggesting budgetary constraints may influence AI implementation decisions. However, a smaller percentage 21.2% (5.9%strongly disagree 6.4% disagree, 8.9%somewhat disagree) disagree or only somewhat agree, suggesting other factors may hold more weight. A significant portion (16.8%) remains neutral, suggesting uncertainty or a need for further evaluation.

4.1.3 Social Influence

Table 4.3: Social Influence

		Strongly disagree	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly agree**	**Total**
It is easy for me to become skilful at AI technologies in	**Frequency**	8	13	12	47	38	67	17	202
	Percent	4	6.4	5.9	23.3	18.8	33.2	8.4	100

learning activities									
People who are important to me think that I should use AI in my learning	**Frequency**	9	7	15	37	48	59	27	202
	Percent	4.5	3.5	7.4	18.3	23.8	29.2	13.4	100
People will use AI for learning activities.	**Frequency**	5	4	8	14	47	77	47	202
	Percent	2.5	2	4	6.9	23.3	38.1	23.3	100
People will be cooperative in using AI for learning activities	**Frequency**	7	9	12	24	57	76	17	202
	Percent	3.5	4.5	5.9	11.9	28.2	37.6	8.4	100

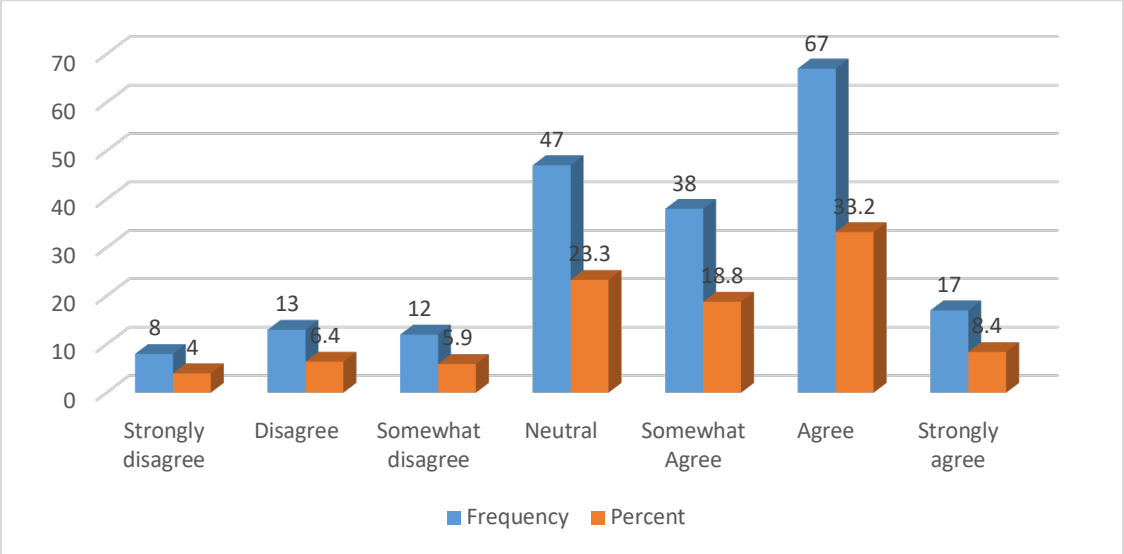


Figure 4.10: People who influence my behaviour think I should use AI in my learning.

The above figure 4.10 shows the data of survey results, a sizable percentage of participants 60.4% (8.4strongly agree, 33.2% agree, 18.8%somewhat agree) agree, at least somewhat, that those who have the power to influence their behaviour believe AI should be used in educational activities. Nonetheless, a sizable portion of respondents (23.3%) express no opinion, which may be a sign of ambivalence or a lack of definite outside influence on their decisions about the use of AI. However, a lower percentage 16.3% (4.0% strongly disagree, 6.4% disagree, 5.9% somewhat disagree) either disagrees or disagrees considerably, which may be a result of opposition or divergent views held by significant figures regarding the application of AI to learning.

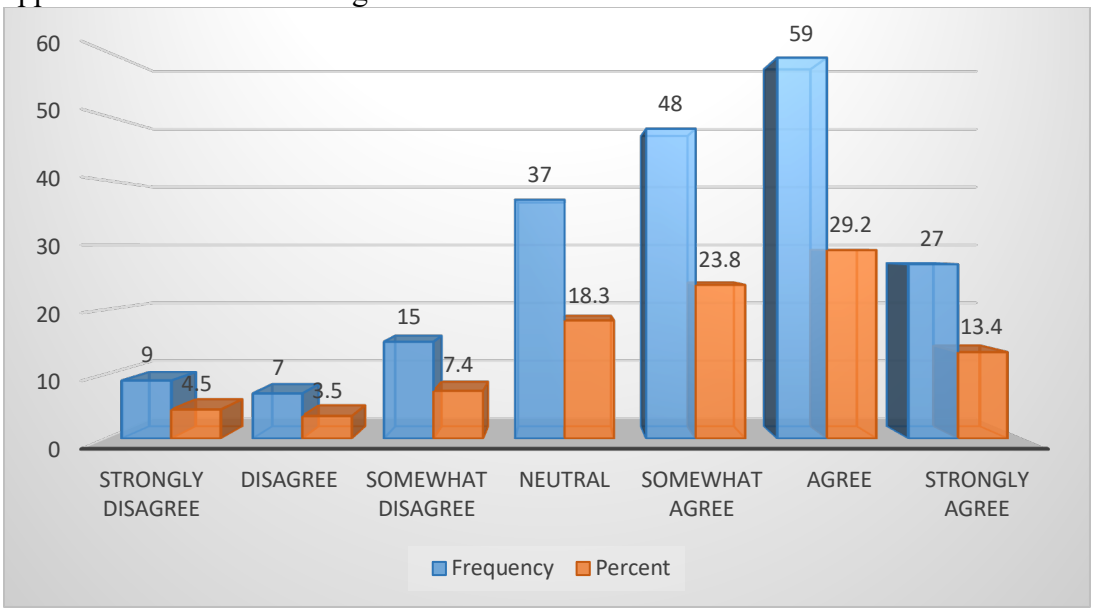


Figure 4.11: People who are important to me think that I should use AI in my learning

The above figure 4.11 presents the data of the survey showing that a majority of respondents 66.4% (13.4% strongly agree, 29.2agree, and 23.8%somewhat agree) believe significant others should use AI in their learning, indicating strong social endorsement. However, 18.3% are neutral, suggesting uncertainty. A smaller segment 15.4% (4.5%strongly disagree, 3.5% disagree, 7.4% somewhat agree) disagrees, suggesting a lack of support or differing opinions from important individuals.

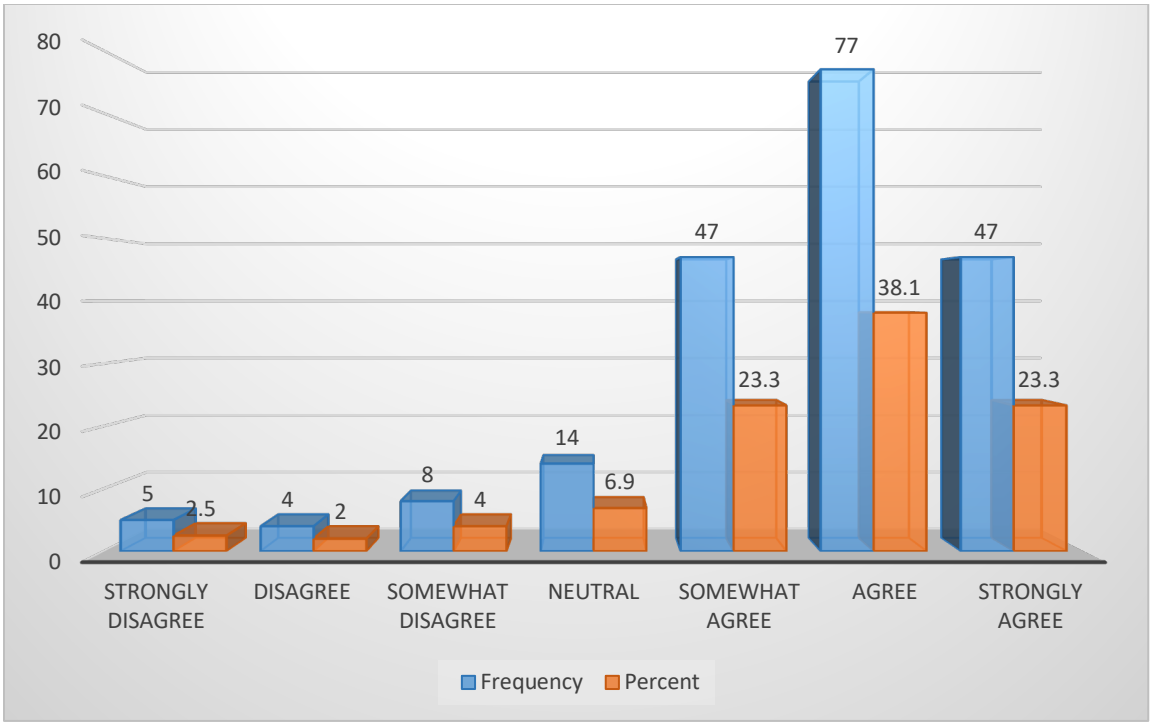


Figure 4.12: People will use AI for learning activities.

The above figure 4.12 shows the data of study results, there is a general consensus that AI will be used in educational settings. A sizable majority of respondents 84.7% (23.3% strongly agree, 38.1%agree, 23.3%somewhat agree) indicate differing degrees of agreement with this idea, indicating a widespread expectation on the use of AI in educational settings in the future. 6.9% of respondents are neutral, indicating some ambivalence or doubt regarding the broad application of AI in education. However, just a tiny percentage of respondents 8.5% (2.5%strongly disagree, 2.0disagree, 4.0%somewhat disagree) disagreed or disagreed somewhat, suggesting that there is little scepticism regarding the use of AI in educational settings.

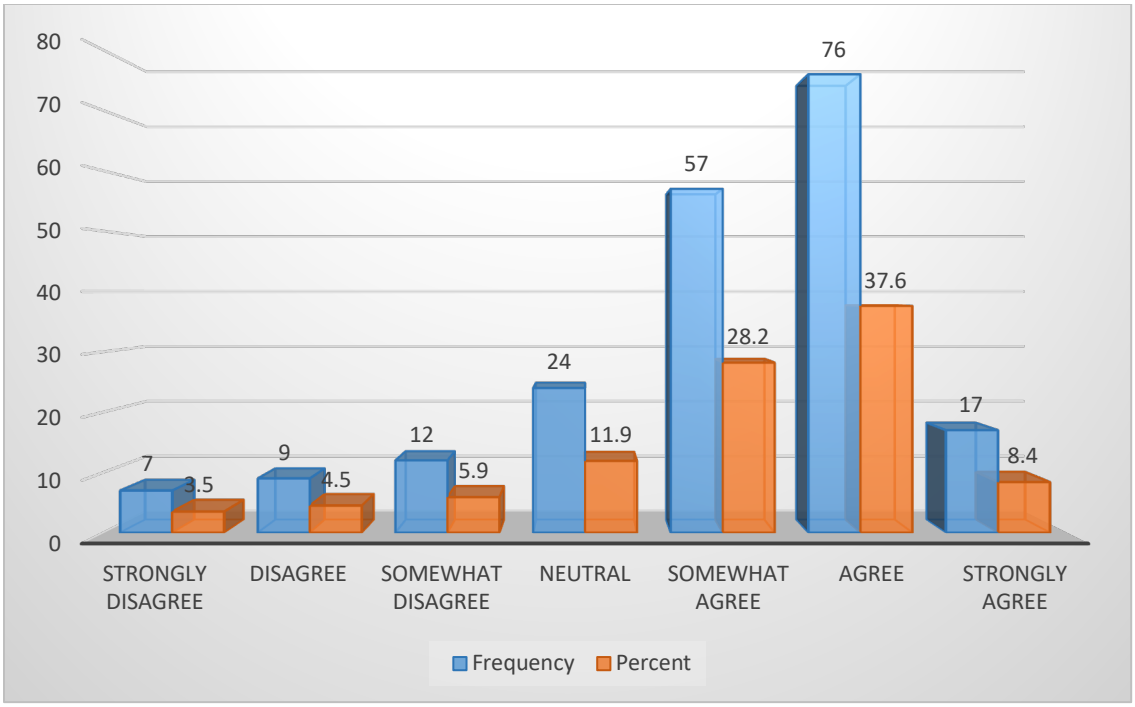


Figure 4.13: People will be cooperative in using AI for learning activities

In the above figure, 4.13 shows the data of study results, most participants 74.2%(8.4%strongly agree, 27.6%agree, and 28.2% somewhat agree), albeit to differing degrees, think that people will cooperate when AI is used for educational purposes. A sizeable fraction of respondents (11.9%) are ambivalent or unclear regarding the degree of cooperation people may provide when it comes to using AI in learning. However, a lower percentage 13.9(3.5% strongly disagree, 4,5%disagree, 5.9%somewhat disagree)% reject or disagree with this statement to some extent, which suggests scepticism or worries about the likelihood of collaboration in the use of AI for educational reasons.

4.1.4 Facilitating Conditions

Table 4.4: Facilitating Conditions

		Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat Agree	Agree	Strongly agree	Total
My organization has the right resources for AI	**Frequency**	15	19	18	39	48	46	17	202
	Percent	7.4	9.4	8.9	19.3	23.8	22.8	8.4	100
My organization has the expertise for AI in case technical assistance is required	**Frequency**	17	25	19	36	49	40	16	202
	Percent	8.4	12.4	9.4	17.8	24.3	19.8	7.9	100
My organization has the knowledge necessary to operate Ai	**Frequency**	11	12	19	27	52	54	27	202
	Percent	5.4	5.9	9.4	13.4	25.7	26.7	13.4	100
The management has expressed interest in AI	**Frequency**	10	13	10	42	39	65	23	202
	Percent	5	6.4	5	20.8	19.3	32.2	11.4	100

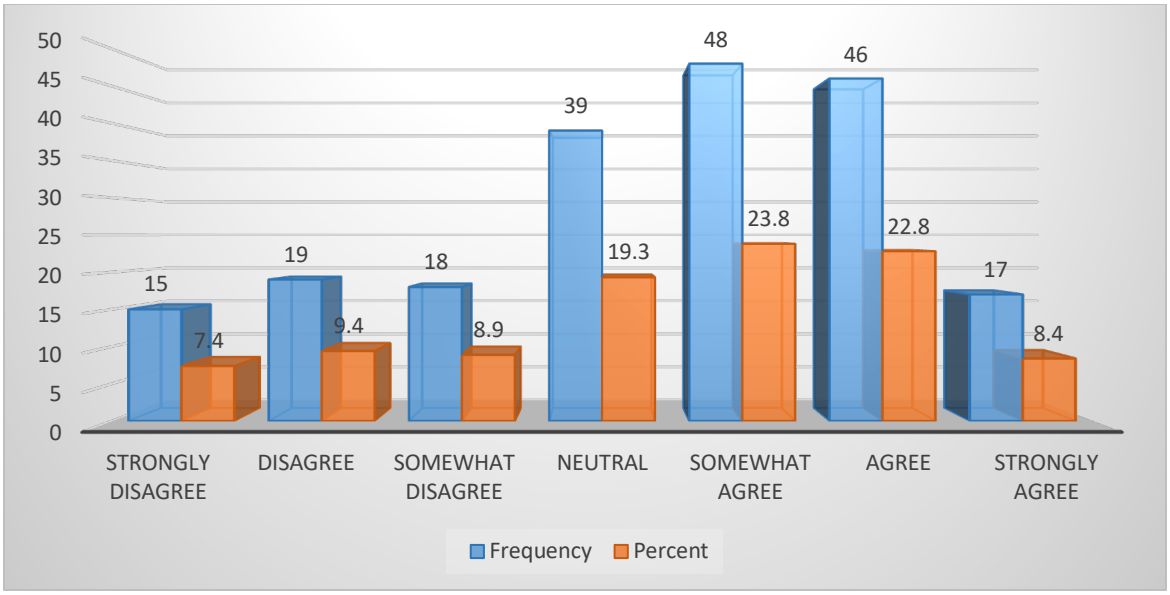


Figure 4.14: My organization has the right resources for AI

The above figure 4.14 shows the data of the survey shows mixed views on organizational readiness for AI. 55% (8.4%strongly agree, 22.8%agree, 23.8%somewhat agree)of respondents agree their organization has the right resources, while 19.3% remain neutral, and 25.7% (7.4%strongly disagree, 9.4%disagree, 8.9%somewhat disagree)disagree, reflecting scepticism about their organization's ability to effectively support AI initiatives.

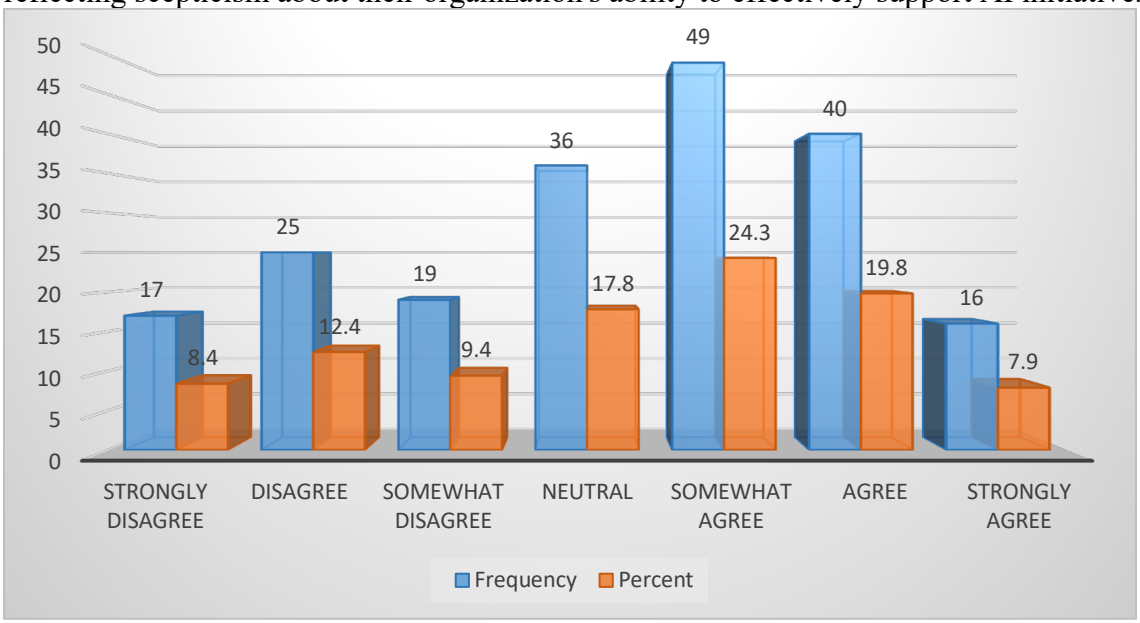


Figure 4.15: If technical support is needed, my organisation possesses the AI competence.

The above figure 4.15 presents the data of the survey revealing a split in opinions on AI knowledge availability within businesses. 52% (7.9%strongly agree, 19.8%gree, 24.3%somewhat agree) of respondents believe their organization has essential AI expertise, while 17.8% feel ambiguous or conflicted. A significant minority 30.2% (8.4%strongly disagree, 12.4% disagree, and 9.4%somewhat disagree) express doubts or uncertainty about the suitability of their company's AI knowledge, indicating a mixed perspective on organizational AI expertise.

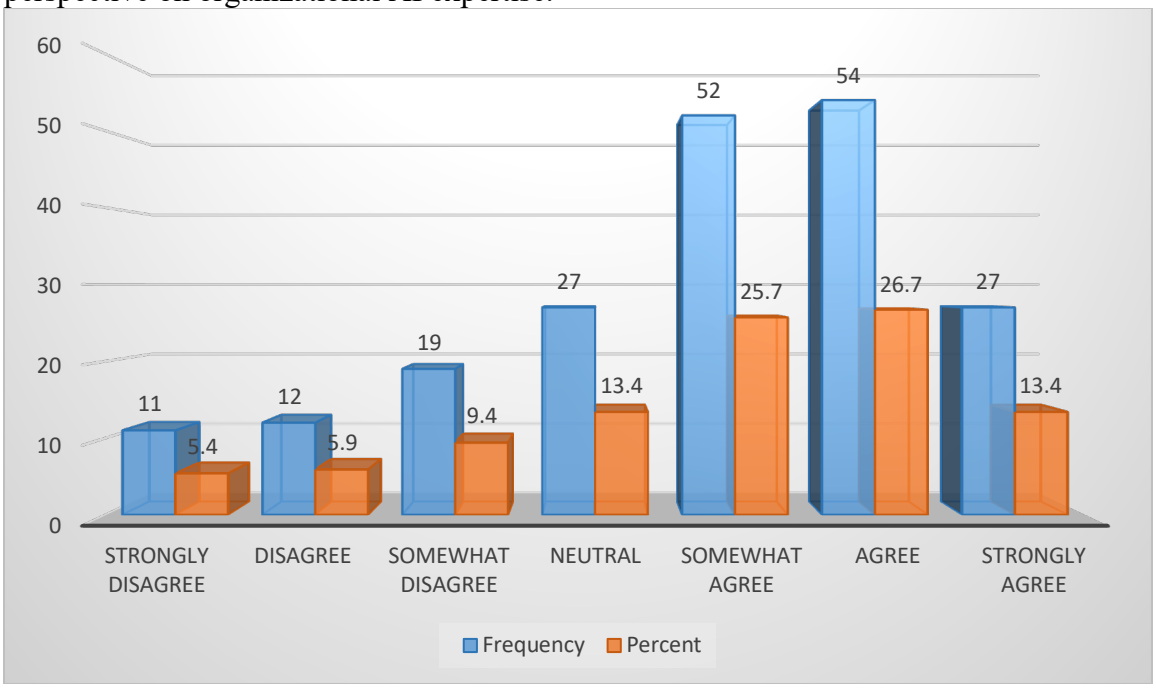


Figure 4.16: My organization knows necessary to operate Ai

The above figure 4.16 presents the data of the survey shows a majority of respondents 65.8% (13.4% strongly agree, 26.7% agree, 25.7% somewhat agree) believe their organization has the necessary knowledge to operate AI, with a significant portion remaining neutral (13.4%) and a smaller segment 20.7% (5.4%strongly disagree, 5.9%disagree, 9.5%somewhat disagree) showing concerns or skepticism.

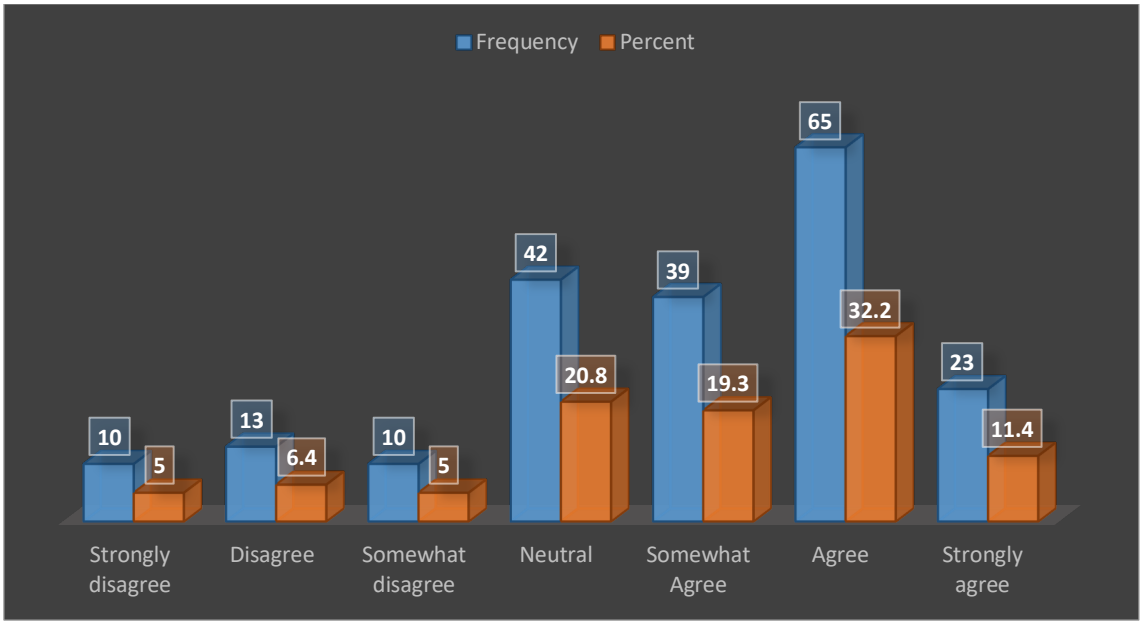


Figure 4.17: The management has expressed interest in AI

The above figure 4.17 presents the data of the survey showing a mixed perception of management interest in AI, with 62.9% (11.4%strongly agree, 32.2%agree, 19.3%somewhat agree) of respondents agreeing or strongly agreeing. However, 20.8% remain neutral, and 18.4% (5% strongly disagree, 6.4%disagree, 5%somewhat disagree) disagree, indicating scepticism or minimal interest.

4.1.4 Technology Readiness

Table 4.5: Technology Readiness

		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Total**
New technologies contribute to a better quality of life	Frequency	3	7	32	107	53	202
	Percent	1.5	3.5	15.8	53	26.2	100
Only a sectional, including 5%, expressed strong disagreement or disagreement. The important	Frequency	4	6	35	106	51	202
	Percent	2	3	17.3	52.5	25.2	100
	Frequency	4	17	44	101	36	202

Technology gives people more control over their daily lives	Percent	2	8.4	21.8	50	17.8	100
Technology makes me more productive in my personal life	Frequency	5	4	42	108	43	202
	Percent	2.5	2	20.8	53.5	21.3	100
Other people come to me for advice on new technologies	Frequency	9	31	66	80	16	202
	Percent	4.5	15.3	32.7	39.6	7.9	100
In general, I am among the first in my circle of friends to acquire new technology when it appears	Frequency	8	41	75	60	18	202
	Percent	4	20.3	37.1	29.7	8.9	100
Table: I can usually figure out new high-tech products and services without help from others	Frequency	3	25	56	88	30	202
	Percent	1.5	12.4	27.7	43.6	14.9	100
I keep up with the latest technological developments in my areas of interest	Frequency	4	20	53	94	31	202
	Percent	2	9.9	26.2	46.5	15.3	100
When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do	Frequency	12	40	71	65	14	202
	Percent	5.9	19.8	35.1	32.2	6.9	100
Technical support lines are not helpful because they don't explain things in terms I understand	Frequency	9	62	68	53	10	202
	Percent	4.5	30.7	33.7	26.2	5	100
	Frequency	20	66	51	57	8	202

Sometimes, I think that technology systems are not designed for use by ordinary people	Percent	9.9	32.7	25.2	28.2	4	100
There is no such thing as a manual for a high-tech product or service that's written in plain language	Frequency	12	41	69	68	12	202
	Percent	5.9	20.3	34.2	33.7	5.9	100
People are too dependent on technology to do things for them	Frequency	5	16	68	76	37	202
	Percent	2.5	7.9	33.7	37.6	18.3	100
Too much technology distracts people to a point that is harmful	Frequency	7	30	56	78	31	202
	Percent	3.5	14.9	27.7	38.6	15.3	100
Technology lowers the quality of relationships by reducing personal interaction	Frequency	9	30	58	83	22	202
	Percent	4.5	14.9	28.7	41.1	10.9	100
I do not feel confident doing business with a place that can only be reached online	Frequency	22	66	48	55	11	202
	Percent	10.9	32.7	23.8	27.2	5.4	100

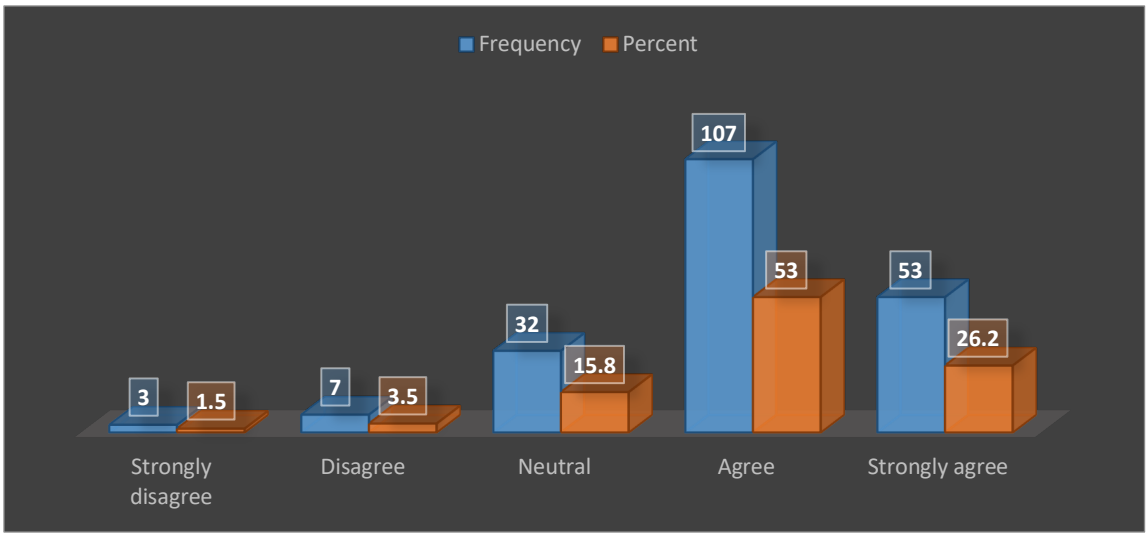


Figure 4.18: Better life is facilitated by new technologies.

The above figure presents the data of the survey results suggesting a major belief that new technologies increase the quality of life, with 79.2% of the accused agreeing with this statement, or strongly agreeing with it. Only a sectional, including 5%, expressed strong disagreement or disagreement. The important proportion of neutral responses (15.8%) suggests a nuanced perception, hypothetically reflecting thoughtful optimism or uncertainty depending on specific contexts or experiences with technology.

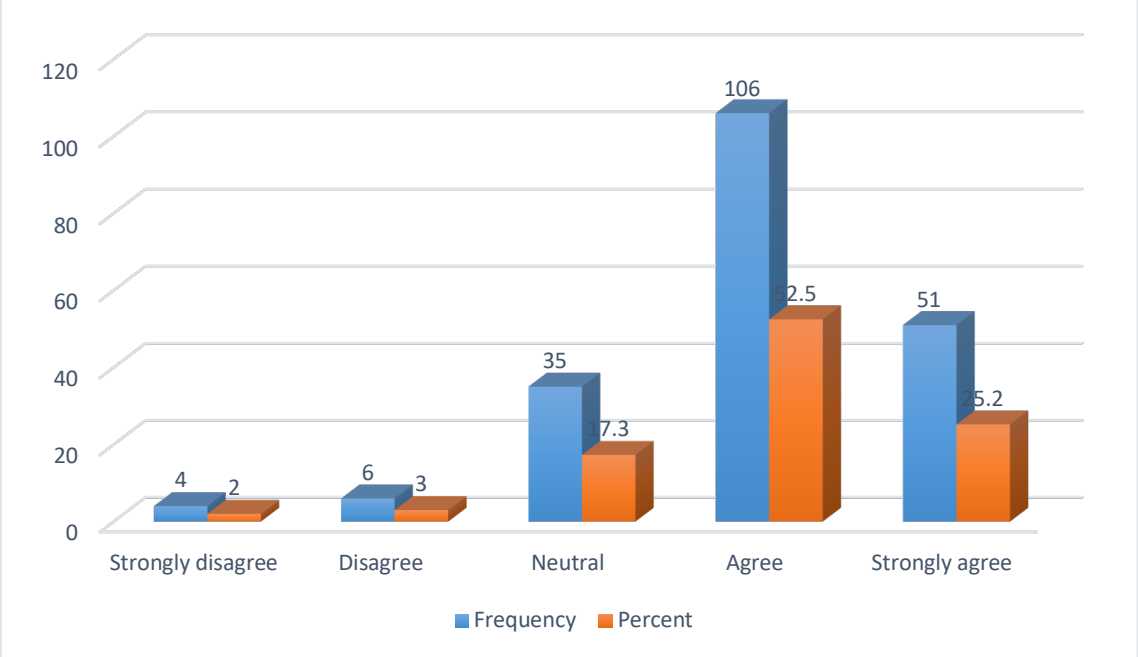


Figure 4.19: Technology gives me more freedom of mobility

The above figure 4.19 presents the data of the survey results highlighting a significant majority (77.7%) who observe technology as affording them greater freedom of mobility, with over half (52.5%) expressing agreement and a quarter (25.2%) strongly agreeing. Conversely, only a small portion (5%) holds a conflicting view, indicating that a vast majority acknowledge technology's role in attractive mobility. The relatively high proportion of neutral responses (17.3%) suggests a potential range of experiences and dependencies on technology for mobility, influenced by factors like availability, affordability, and personal preferences.

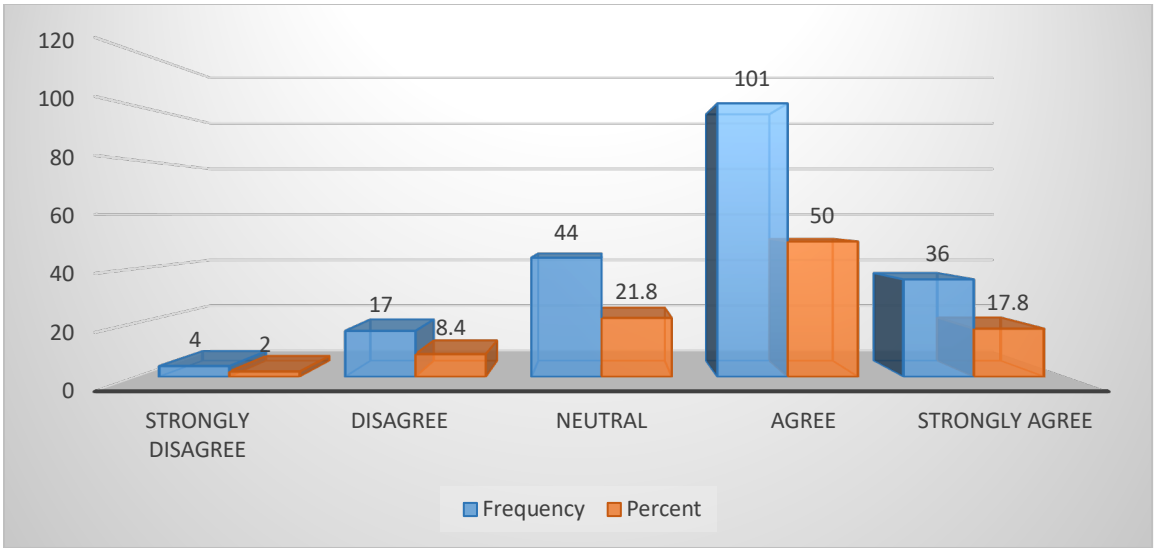


Figure 4.20: People have more power over their daily lives because to technology.

The above figure 4.20 presents the data of the study results showing a divided viewpoint regarding the extent to which technology authorizes individuals to control their daily lives. While an important portion (67.8%) either concur or concur strongly that technology improves such control, a notable minority (10.4%) holds conflicting views, communicating either strong disagreement or disagreement. Meanwhile, a substantial proportion (21.8%) remains neutral, potentially reflecting uncertainties or difficulties in assessing the degree of control technology affords in daily life.

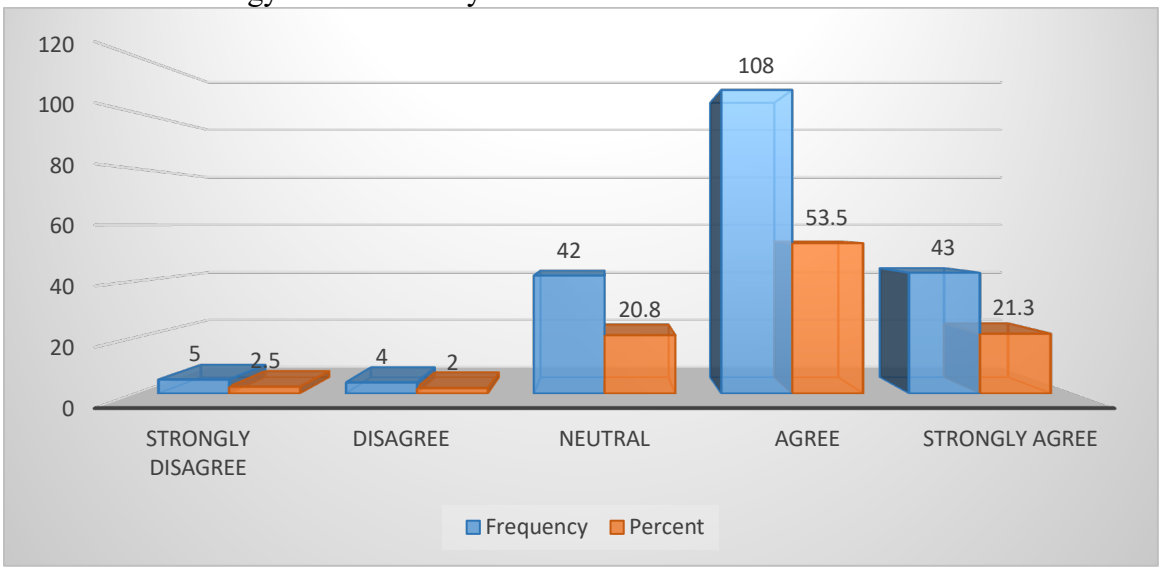


Figure 4.21: I'm more productive in my personal life thanks to technology.

The above figure 4.21 presents the inspection data indicating a prevailing belief among respondents that technology donates positively to personal productivity, with a significant majority (74.8%) either agreeing or strongly agreeing with this statement. Specifically, over half (53.5%) express agreement and more than a fifth (21.3%) strongly agree. Conversely, a small minority (4.5%) holds dissenting views, indicating a perceived lack of correlation between technology and personal productivity. Meanwhile, the proportion of neutral responses (20.8%) underscores a spectrum of experiences and perceptions.

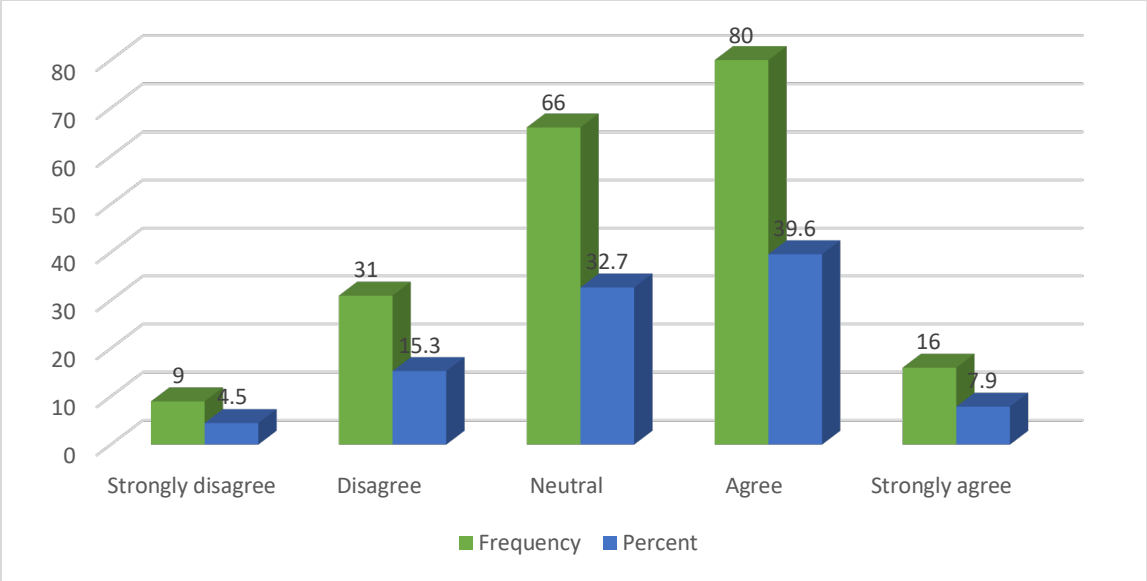


Figure 4.22: I'm consulted by others for guidance on emerging technology.

The above figure 4.22 shows the data of review results reveal a mixed pattern in terms of individuals being required out for information on new technologies, with a plurality (47.5%) either agreeing or strongly agreeing that others method them for such guidance. However, an extensive proportion (19.8%) express disagreement, comprising those who disagree with the statement or strongly disagree with it. Additionally, the large segment of neutral responses (32.7%) suggests a spectrum of experiences and observations regarding one's role as an advisor on new technologies.

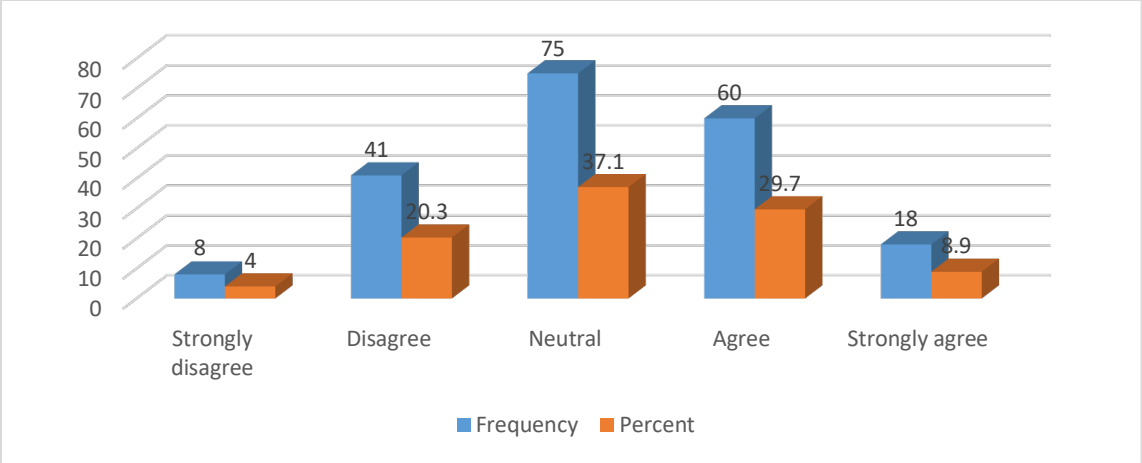


Figure 4.23: Generally speaking, I am one of the first people in my group of friends to get new technology when it becomes available.

The above figure 4.23 presents the data of review findings suggesting a various range of attitudes and behaviours about the gaining of new technology among respondents' circles of friends. A significant proportion (38.6%) express disagreement with being among the first to adopt new technology, including both those who strongly disagree (4.0%) and those who disagree (20.3%). Meanwhile, the percentage of those who agree or strongly agree (38.6%) is roughly equivalent. The extensive contingent of neutral responses (37.1%) suggests a spectrum of attitudes, potentially influenced by factors such as personal interest, financial considerations, and perceived utility of new technologies.

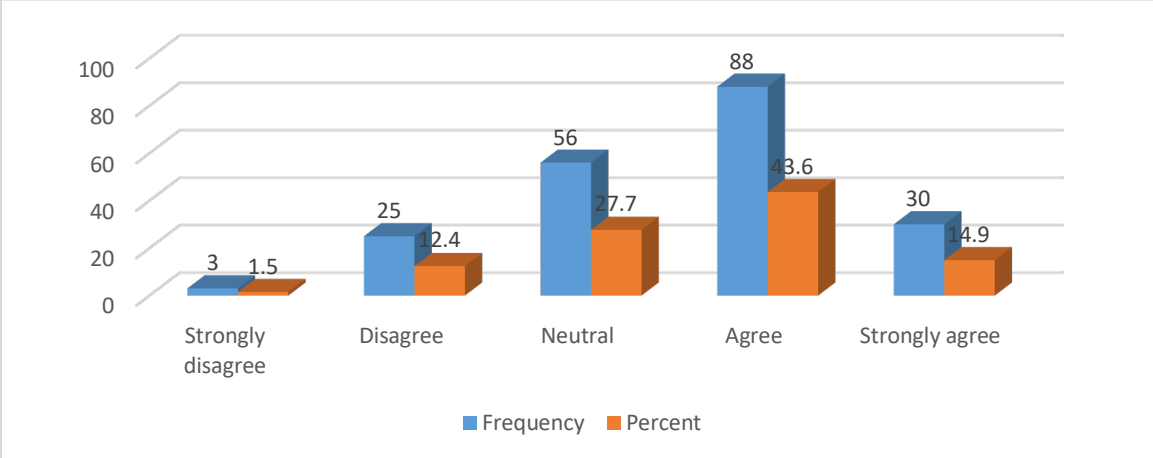


Figure 4.24: Most of the time, I can figure out new high-tech products and services on my own without assistance.

The above figure 4.24 presents the survey data specifying a notable degree of independence among respondents when it comes to understanding fresh high-tech goods and offerings, with a majority (58.5%) either agreeing or strongly agreeing that they can typically decipher such innovations without external support. Specifically, 43.6% agree and 14.9% strongly agree with this statement. Equally, a minority (13.9%) express disagreement, encompassing both those who strongly disagree (1.5%) and those who disagree (12.4%). The considerable proportion of neutral responses (27.7%) suggests a spectrum of experiences and confidence levels.

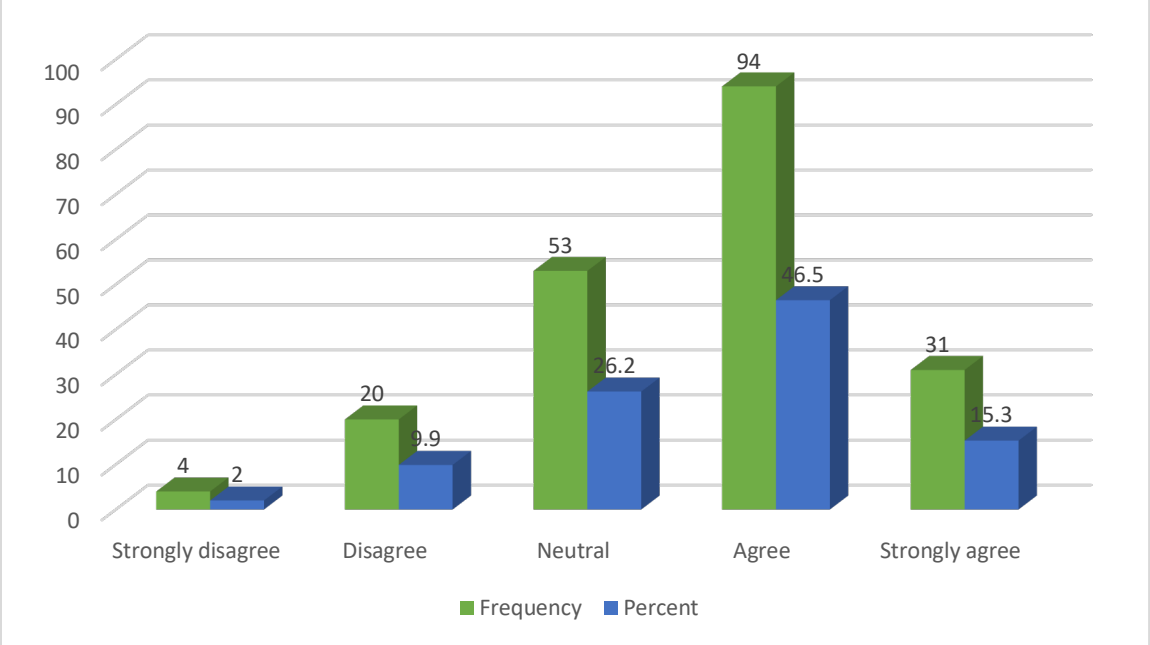


Figure 4.25: I stay up to date on the most recent advancements in technology. in my areas of interest

The above figure 4.25 shows the investigation results suggest a significant level of appointment among respondents in keeping well-informed of the most recent technical advancements in their fields of expertise, with the majority (61.8%) strongly agreeing or agreeing. Specifically, 46.5% agree and 15.3% strongly agree. Conversely, a minority (11.9%) express disagreement, comprising both those who strongly disagree (2.0%) and

those who disagree (9.9%). The proportion of neutral responses (26.2%) suggests a range of experiences and levels of active pursuit in staying updated with technological trends.

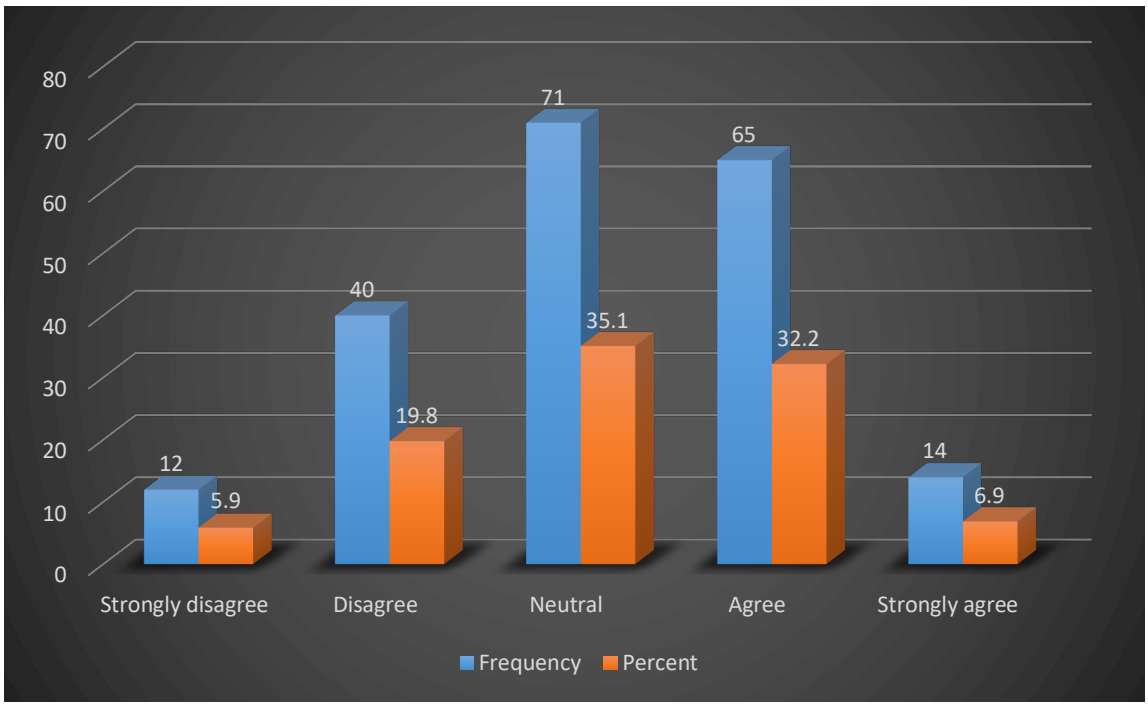


Figure 4.26: Sometimes, when I receive technical support from a high-tech product or service provider, I feel like someone who is more knowledgeable than I am is taking advantage of me.

The above figure 4.26 presents the data of the survey results revealing a mixed perception among the accused regarding the subtleties of technical support meetings with earners of high-tech products or services. While an important proportion (65.3%) express agreement or strong agreement with infrequently feeling taken advantage of by support personnel who possess greater knowledge, a notable minority (25.7%) holds dissenting views, indicating either neutrality (35.1%), disagreement (19.8%), or strong disagreement (5.9%). This suggests a range of experiences and interpretations, potentially influenced by factors such as announcement style, slide of support processes, and individual levels of technical ability.

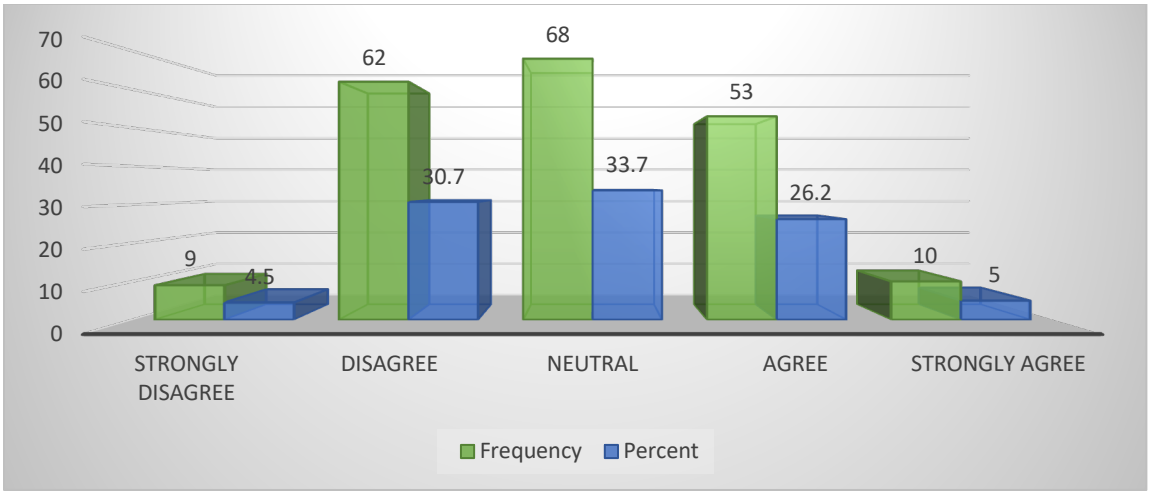


Figure 4.27: I realise that technical support lines aren't very useful because they don't provide clear explanations.

The above figure 4.27 presents the survey results highlighting a diverse range of perspectives regarding the effectiveness of technical support lines in terms of communication simplicity. While an extensive portion (57.4%) expresses either agreement or strong agreement that support lines often fail to explain things in logical terms, a significant minority (35.2%) holds rebel views, surrounding those who either disagree (30.7%) or strongly disagree (4.5%) with the statement. The substantial proportion of neutral responses (33.7%) suggests a spectrum of experiences and perceptions.

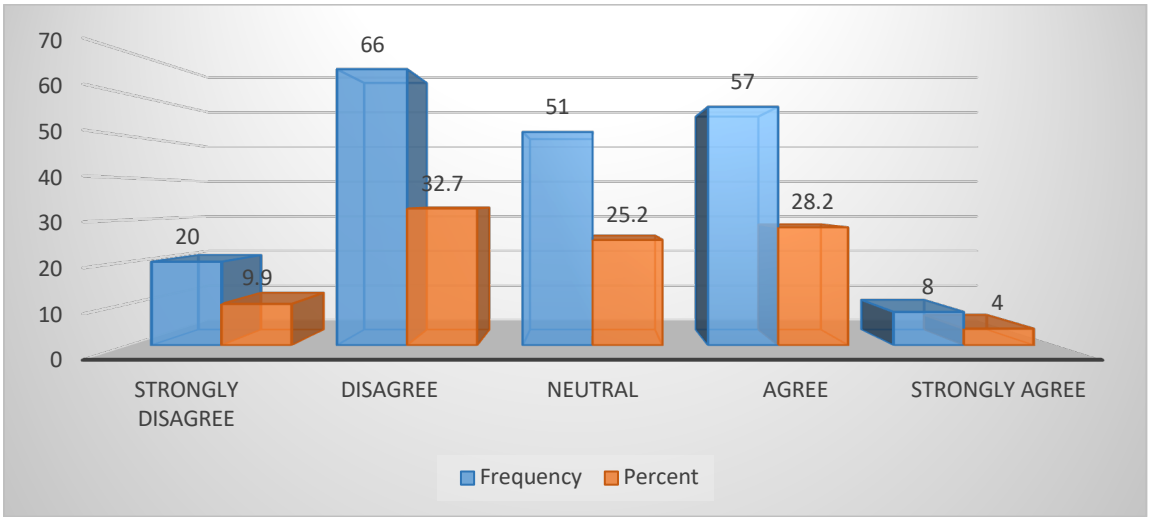


Figure 4.28: There are moments when I believe that technological systems are not meant for everyday use by individuals.

The above Figure 4.28 shows the data of the review findings brighten a nuanced perspective regarding the accessibility and user-sociability of technology systems. This sentimentality is particularly noticeable among those who either agree (28.2%) or strongly agree (4.0%) with the statement. Equally, a significant minority (42.6%) holds rebel views, including those who disagree (32.7%) or strongly disagree (9.9%) with the notion that technology systems are ineffectually designed for ordinary users. The proportion of neutral responses (25.2%) suggests a spectrum of experiences and perceptions.

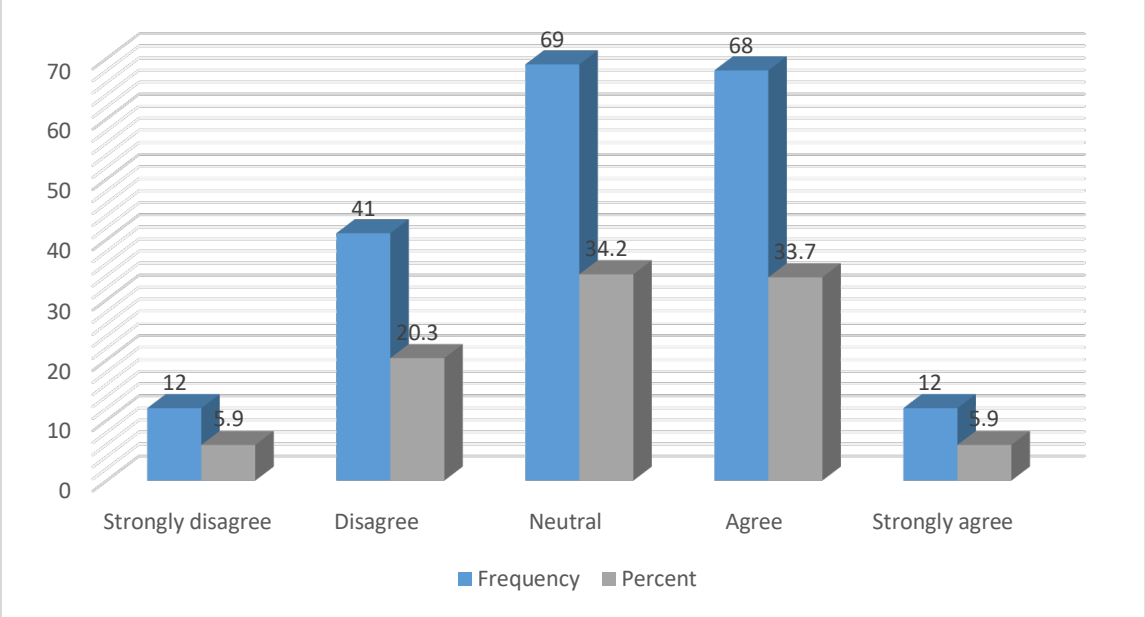


Figure 4.29: A high-tech product or service manual that is written in simple terms does not exist.

The above survey data portrays a diverse range of opinions regarding the accessibility of manuals for high-tech products or services. This sentiment is particularly evident among those who agree (33.7%) or strongly agree (5.9%) with the statement. Conversely, a significant minority (26.2%) holds dissenting views, comprising those who either disagree (20.3%) or strongly disagree (5.9%) with the notion that manuals are inadequately written in plain language. The proportion of neutral responses (34.2%) suggests a spectrum of

experiences and perceptions, potentially influenced by factors such as the complexity of the technology.

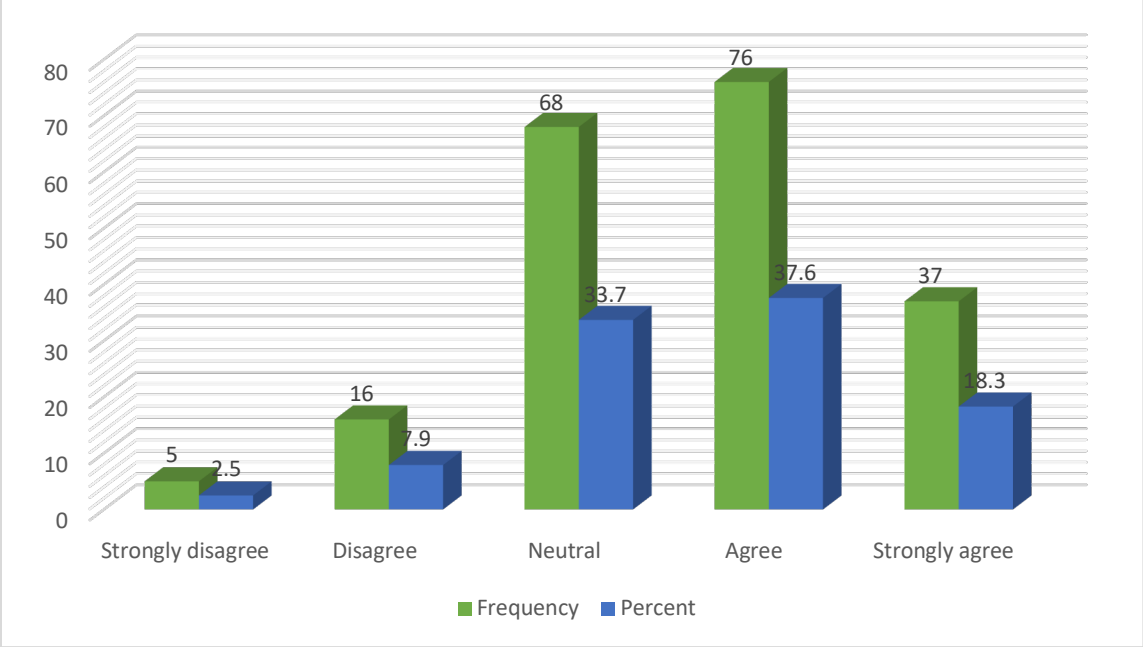


Figure 4.30: People rely too much on technology to complete tasks for them.

The above figure 4.30 presents the survey data reflecting a mixed perspective on the extent of dependency on technology among individuals. This sentiment is particularly pronounced among those who either agree (37.6%) or strongly agree (18.3%) with the statement. Conversely, a notable minority (10.4%) holds dissenting views, comprising those who either strongly disagree (2.5%) or disagree (7.9%) with the notion that people are excessively dependent on technology. The proportion of neutral responses (33.7%) suggests a spectrum of experiences and perceptions, potentially influenced by factors such as cultural norms, generational differences, and individual attitudes towards technology use.

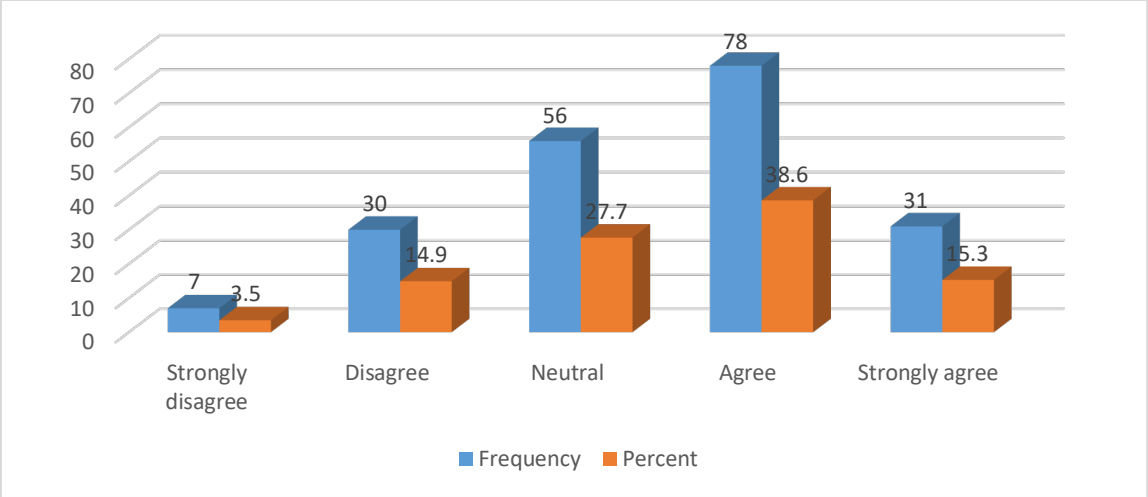


Figure 4.31: People who use technology excessively become harmfully distracted.

The above Figure 4.29 shows the survey findings show a various range of opinions regarding the potential harm caused by extreme technological disruptions. This is particularly pronounced among those who either agree (38.6%) or strongly agree (15.3%) that too much technology can be harmful due to its disturbing nature. Equally, an important minority (18.4%) holds insolent views, comprising those who either strongly disagree (3.5%) or disagree (14.9%) with the notion that technology-induced distractions are fundamentally harmful. The proportion of neutral responses (27.7%) suggests a spectrum of experiences and perceptions.

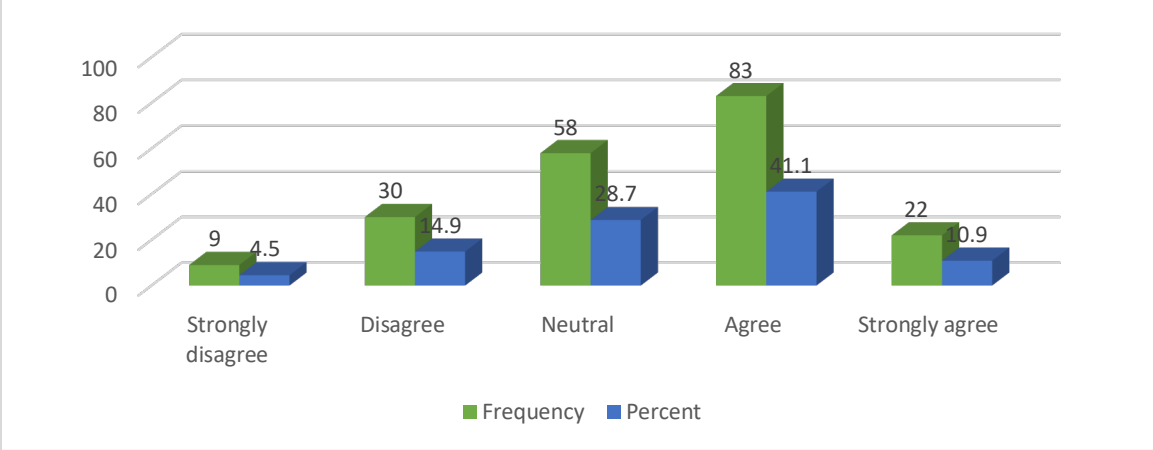


Figure 4.32: Because it minimises face-to-face communication, technology degrades relationships.

The above Figure 4.32 presents the preview data and reveals a nuanced perspective on the impact of technology on relational relationships. This sentiment is particularly predominant among those who either agree (41.1%) or strongly agree (10.9%) with the statement. Equally, a notable minority (19.4%) holds nonconforming views, containing those who either strongly disagree (4.5%) or disagree (14.9%) with the notion that technology adversely affects the quality of relationships. The proportion of neutral responses (28.7%) suggests a range of experiences and perceptions.

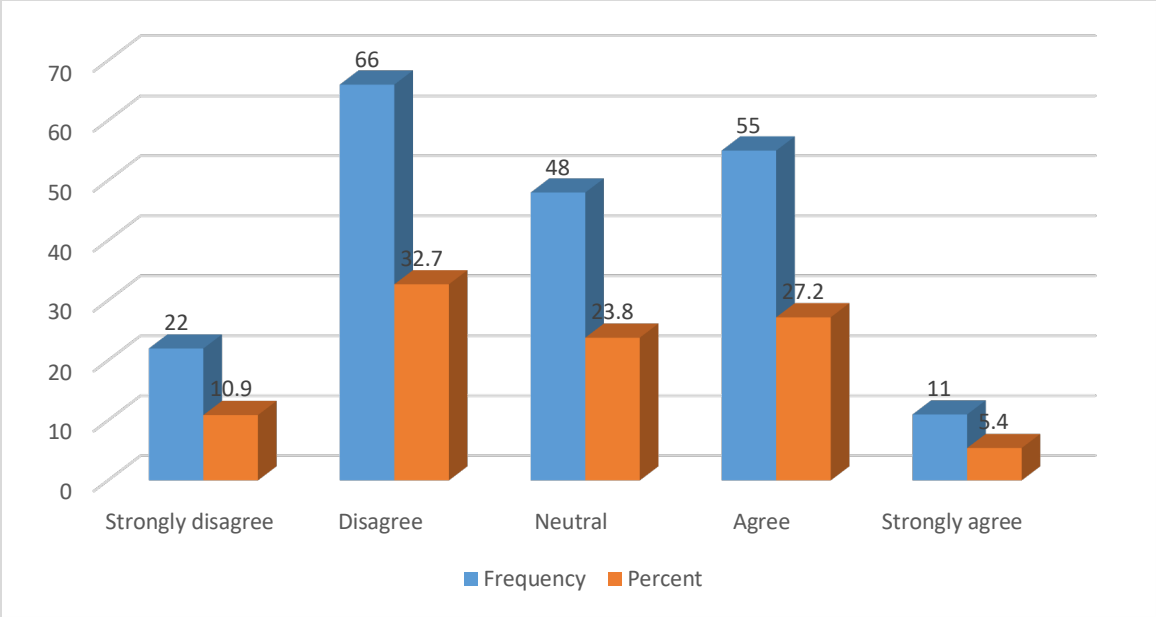


Figure 4.33: Doing business with a location that is only accessible online makes me uneasy.

The above figure 4.33 presents the data indicating that an important portion of people are uncertain about doing business with a company that can only be found online, with 43.6% (22 strongly disagreeing and 66 disagreeing) stating a lack of confidence. In contrast, 32.6% (55 agreeing and 11 strongly agreeing) feel assured in such contacts, while 23.8% remain neutral. This suggests a prevalent skepticism towards online-only businesses.

4.1.5 Knowledge of AI

Table 4.6: How knowledgeable are you about AI?

	Frequency	**Percent**
I have no idea	12	5.9
I am familiar with the AI basics	86	42.6
I am comfortable with what it means but I am not technical	93	46.0
Very comfortable. I work with AI.	11	5.4
Total	202	100.0

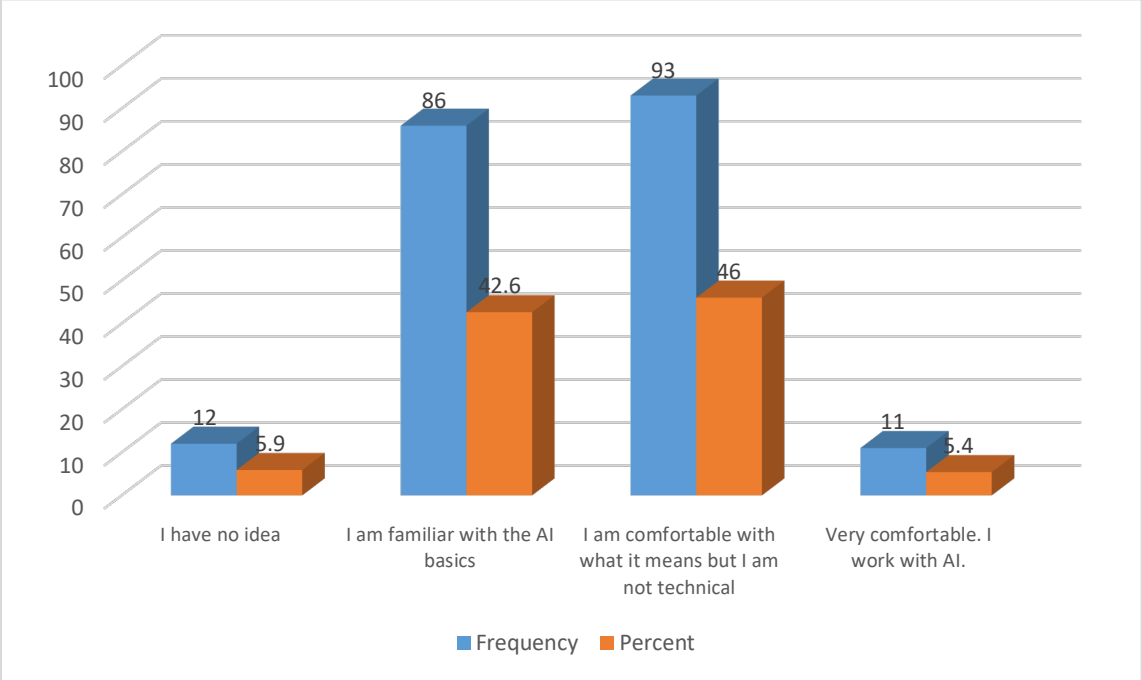


Figure 4.34: To what extent do you know AI?

The above figure 4.34 presents the survey data and specifies a varied level of knowledge and comfort with AI among respondents. An important portion (46%) feels comfortable with the basic concepts of AI but does not have technical expertise, while a slightly smaller group (42.6%) is familiar with the basics. Meanwhile, a smaller so far outstanding percentage (5.4%) claims to be very comfortable with AI, representing that they actively

work with AI technologies. Remarkably, a minority (5.9%) admits to having no idea about AI, suggesting a potential gap in knowledge or awareness.

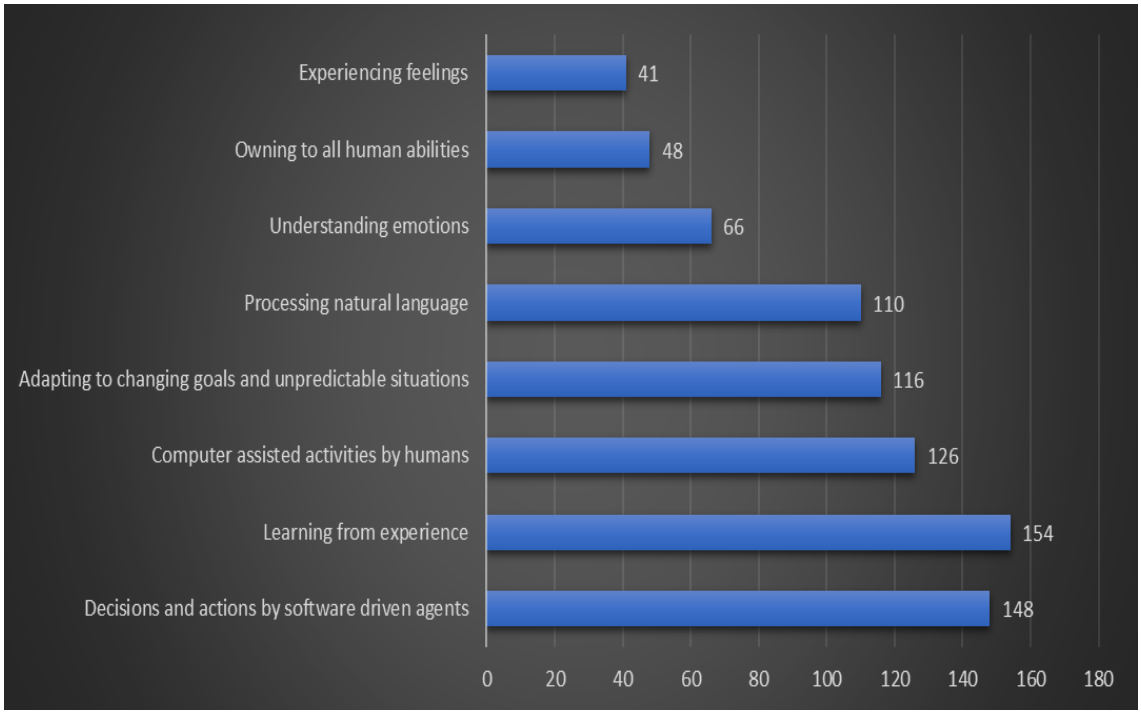


Figure 4.35: Which of the following claims about artificial intelligence is true?

The above figure presents the survey data reveals that respondents predominantly believe AI is capable of learning from experience (154 responses), making decisions autonomously (148 responses), assisting human activities (126 responses), and adapting to changing goals (116 responses). A significant number also recognize AI's ability to process natural language (110 responses). Fewer respondents think AI can understand emotions (66 responses), possess all human abilities (48 responses), or experience feelings (41 responses). This indicates a strong acknowledgment of AI's technical capabilities, while there is skepticism regarding its ability to replicate human emotional and experiential characteristics.

4.1.6 Intention to use AI

Table 4.7: Intention to use AI

		Strongly disagree	Disagree	Somewhat disagree	Neutral	Some what Agree	Agree	Strongly agree	Total
I am considering using AI technologies in my learning activities.	**Frequency**	2	9	13	38	41	73	26	202
	Percent	1	4.5	6.4	18.8	20.3	36.1	12.9	100
I will use AI technologies when performing learning activities as a student.	**Frequency**	3	5	14	40	43	63	34	202
	Percent	1.5	2.5	6.9	19.8	21.3	31.2	16.8	100
I predict that our organization will use AI on a regular basis in the future	**Frequency**	6	7	10	32	37	66	44	202
	Percent	3	3.5	5	15.8	18.3	32.7	21.8	100
I will talk positively about AI for learning activities in the future	**Frequency**	0	5	6	34	38	75	44	202
	Percent	0	2.5	3	16.8	18.8	37.1	21.8	100
I will recommend AI for learning activities to others in the future	**Frequency**	1	3	8	38	31	73	48	202
	Percent	0.5	1.5	4	18.8	15.3	36.1	23.8	100

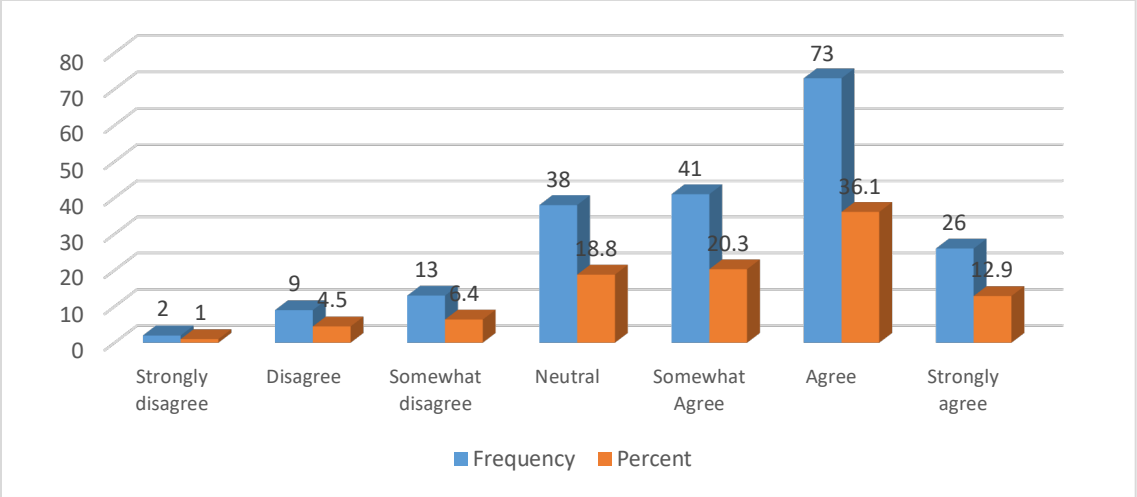


Figure 4.36: I am considering using AI technologies in my learning activities.

The above figure 4.36 shows the survey results reveal a wide-ranging spectrum of attitudes towards integrating AI technologies into learning activities, with a notable majority (69%) expressing agreement or strong agreement with the notion. Specifically, 36.1% agree and 12.9% strongly agree, indicating a significant level of enthusiasm for leveraging AI in educational searches. Equally, a smaller yet still significant proportion (12.9%) either slightly disagree, disagree, or strongly disagree with the idea. The sizable contingent of neutral responses (18.8%) suggests a range of openness or hesitation regarding the combination of AI in learning

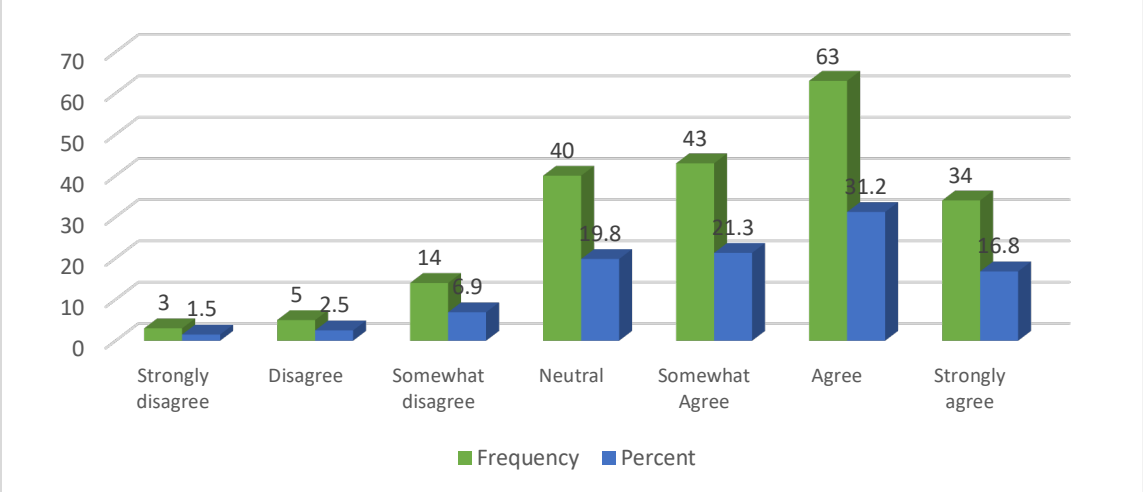


Figure 4.37: I will use AI technologies when performing learning activities as a student.

The above figure 4.37 presents the survey data showing a range of attitudes among respondents regarding the use of AI technologies in their learning activities as students. A substantial majority (48%) express agreement or strong agreement with this idea, with 31.2% agreeing and 16.8% strongly agreeing. Conversely, a smaller yet notable proportion (11%) either somewhat disagree, disagree, or strongly disagree with the idea of incorporating AI technologies into their learning activities. The sizable dependence of neutral responses (19.8%) suggests a spectrum of openness or uncertainty regarding the integration of AI in student learning.

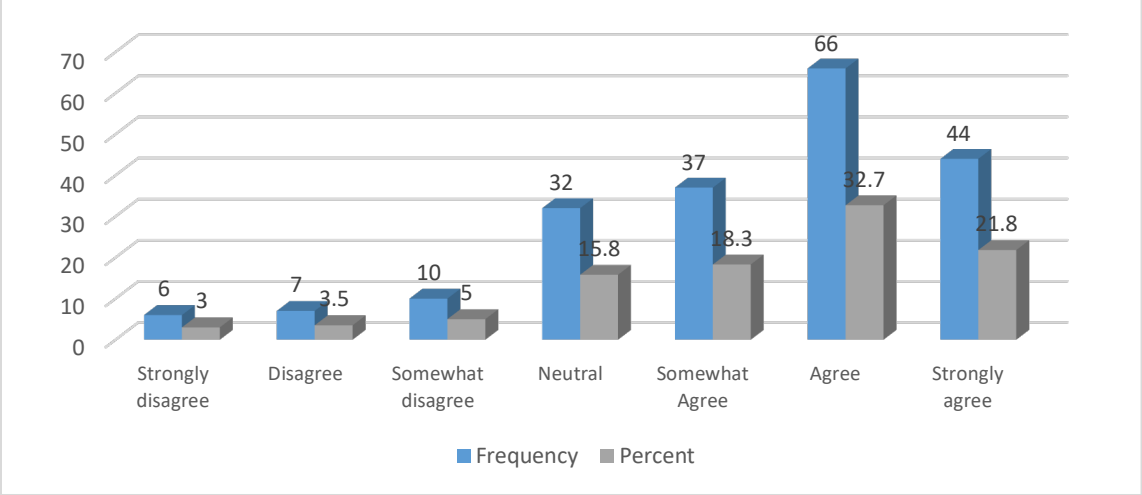


Figure 4.38: I predict that our organization will use AI on a regular basis in the future

The above figure 4.38 shows the data of the review findings showcase a varied viewpoint on the incorporation of AI technologies into learning activities among defendants as students. While a significant majority (48%) express agreement or strong agreement with this concept, a notable minority (11%) hold rebellious views. This suggests a field of attitudes and levels of interest, with some respondents displaying openness or enthusiasm towards AI integration, while others express skepticism or hesitancy. The sizable portion of neutral responses (19.8%) further highlights a range of reservations or mixed sentiments surrounding the implementation of AI in student learning.

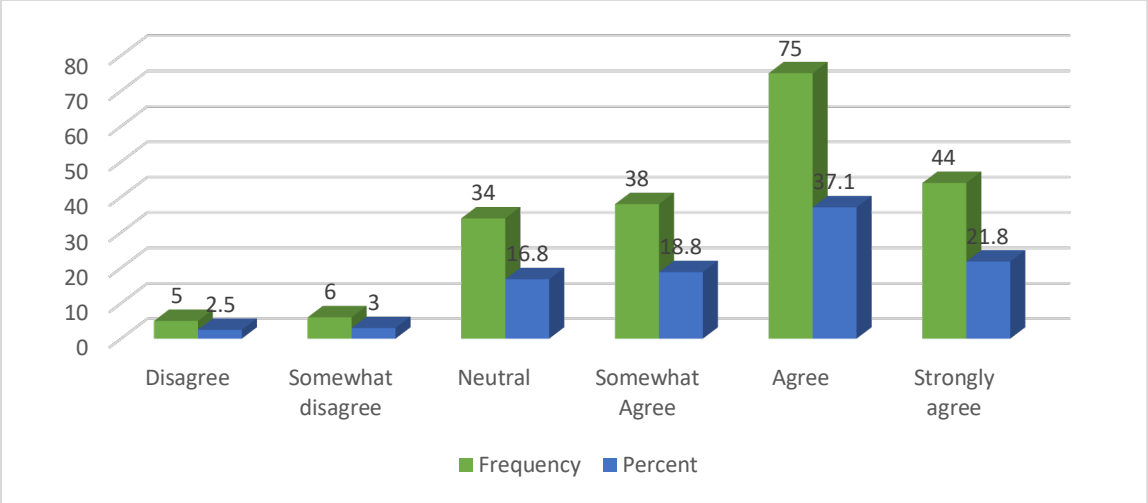


Figure 4.39: I will talk positively about AI for learning activities in the future

The above Figure shows the survey data reveals a mainly positive outlook towards discussing AI for learning activities in the future among respondents, with a notable majority (59.9%) expressing agreement or strong agreement with this statement. Specifically, 37.1% agree and 21.8% strongly agree, Equally, a minority (5.5%) either somewhat disagree or disagree with the idea, suggesting some level of doubt or reservation. The sizable dependence of neutral responses (16.8%) suggests a range of attitudes, potentially reflecting uncertainties or mixed sentiments regarding future discussions about AI in learning activities.

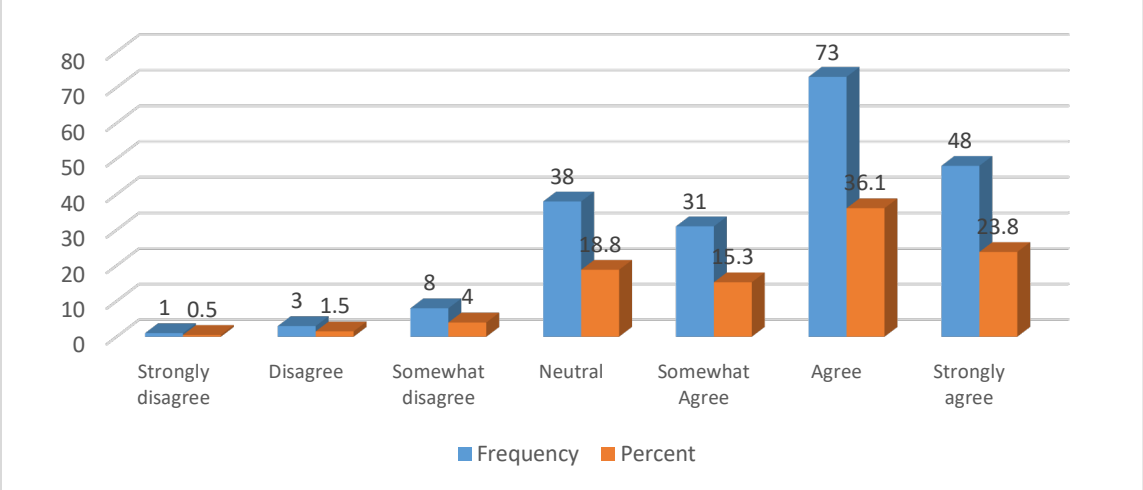


Figure 4.40: I will recommend AI for learning activities to others in the future.

The above figure 4.40 presents the survey results indicating a generally favourable nature towards discussing AI's role in learning activities in the future among respondents, with an important majority (59.9%) stating agreement or strong agreement. This indicates a general interest in supporting the possible benefits of AI within educational contexts. Conversely, only a small minority (5.5%) exhibits disagreement, signifying limited skepticism or reservations about discussing AI in learning. The notable proportion of neutral responses (16.8%) suggests a range of attitudes, potentially reflecting reservations or mixed opinions regarding future discussions about AI's involvement in education.

4.2 Structural Model

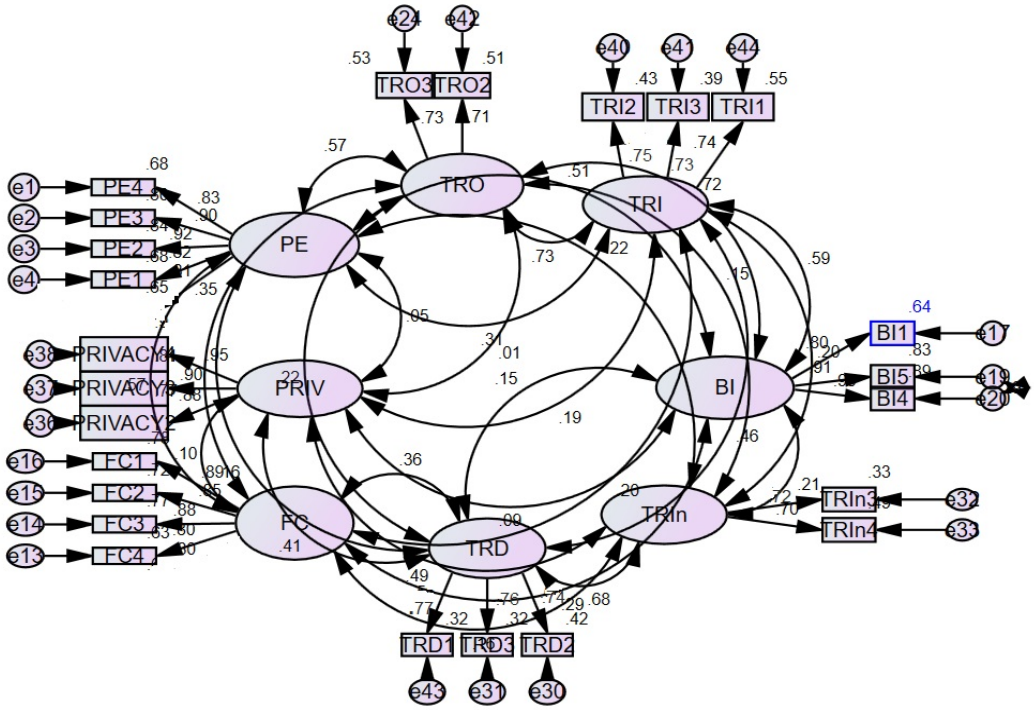


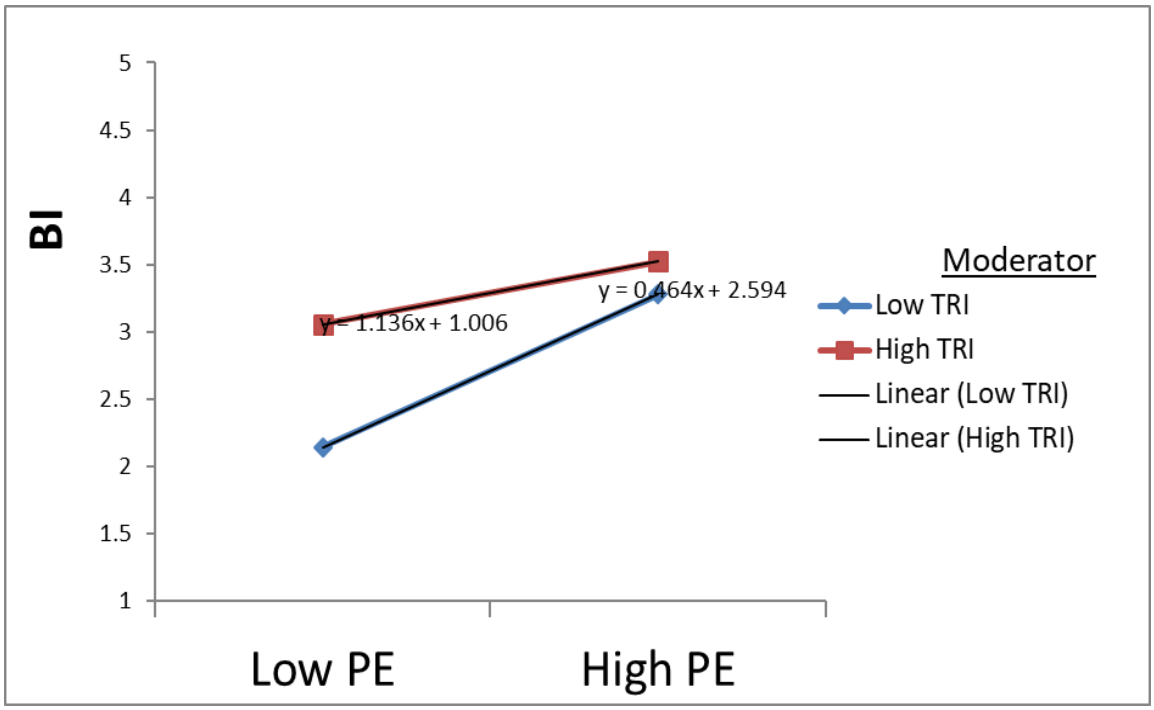
Figure 4.41: Measurement model

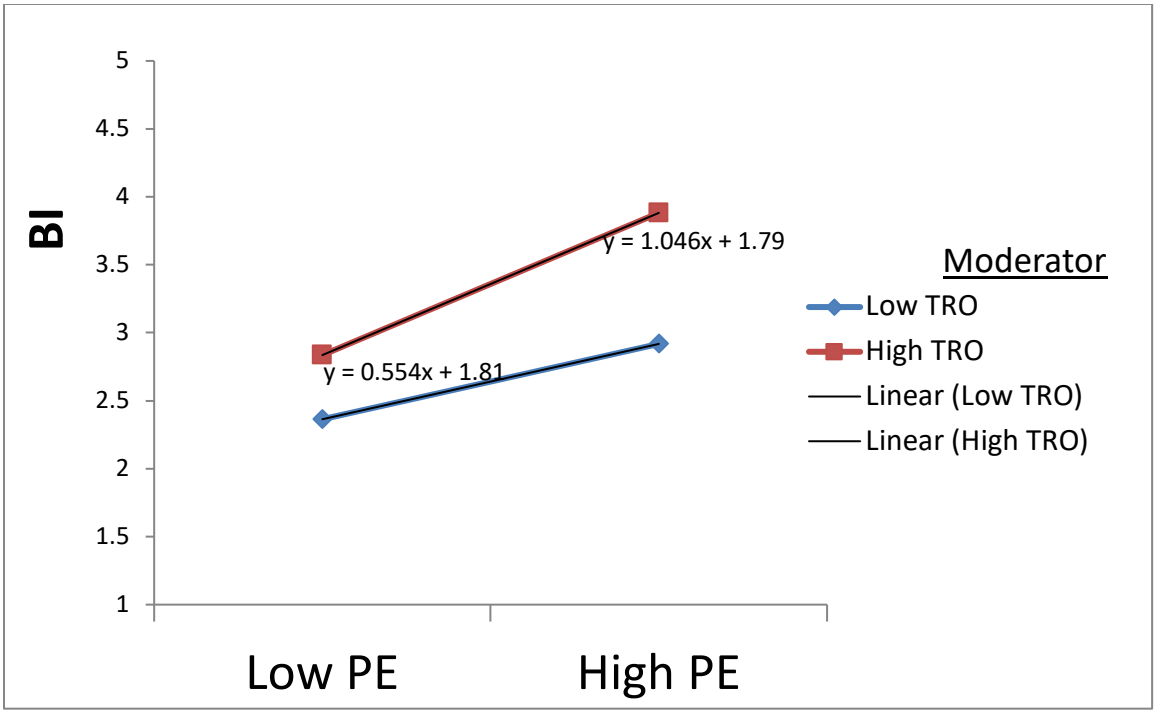
Table 4.8: Interaction effect model results

Relationship	Estimate	S.E.	P
BI<--PE	0.4	0.054	
BI<--FC	0.076	0.039	0.05

BI<--PRIV	0.127	0.032	
BI<--PE_x_TRO	0.123	0.053	0.019
BI<--PE_x_TRIn	0.259	0.107	0.016
BI<--PE_x_TRD	-0.149	0.114	0.191
BI<--PE_x_TRI	-0.168	0.067	0.012
BI<--TRI	0.29	0.072	
BI<--TRO	0.359	0.093	
BI<--TRD	1.134	0.14	
BI<--TRIn	-2.335	0.227	
BI<--PRI_TRI	0.063	0.08	0.432
BI<--PRI_TRD	0.255	0.143	0.074
BI<--PRI_TRIn	-0.275	0.132	0.037
BI<--PRI_TRO	-0.082	0.07	0.244

The results of the structural model confirm H1 (β=0.40, $p<0.05$), which claims that PE has a beneficial influence on BI's decision to adopt AI for learning activities. The findings validated hypothesis H2, according to which FC raises BI. The results showed a positive link between both constructs, contradicting the expectation in H3 that PRIV would negatively influence the BI. It has been discovered that TRI reduces the positive correlation between PE and BI in terms of the interaction effects. The findings also show that the link between PE and BI is strengthened by TRIn and TRO. Put another way, the positive association between PE and BI is stronger when it comes to the positive aspects of technological ready (TRO and TRIn), but the negative components of readiness (TRI) weaken the relationship. It has been discovered that only the TRIn has a negative moderating influence on the association between PRIV and BI. Stated differently, TRIn reduces the magnitude of the correlation between PRIV and BI.


BI
5
4.5
4
3.5
3
2.5
2
1.5
1
y = 1.136x + 1.006
y = 0.464x + 2.594
Moderator
Low TRI
High TRI
Linear (Low TRI)
Linear (High TRI)
Low PE
High PE


BI
5
4.5
4
3.5
3
2.5
2
1.5
1
y = 1.046x + 1.79
y = 0.554x + 1.81
Moderator
Low TRO
High TRO
Linear (Low TRO)
Linear (High TRO)
Low PE
High PE

4.3 Summary of Findings

The current advancements in Gen AI have a significant impact on our findings and cannot be disregarded. As a result, the entire methodology for compiling the results was altered to incorporate these advancements.

The AI in Education survey offers insightful information on respondents' views and perceptions about the use of AI in education inside educational institutions. The poll focuses on a range of AI applications, including as chatbots, virtual tutors, content creation, grading systems, and personalised teaching.

The survey's findings show that people's attitudes towards using AI in educational activities are usually positive, and most people strongly believe that using AI makes learning activities more successful and efficient. Furthermore, there is broad consensus that utilising AI in learning activities saves money and time and raises the standard of output.

However, the survey also shows certain issues, namely, the state of preparedness for the introduction of AI in the company and the expenses connected with it. The answers regarding the readiness of the organization to migrate to AI are diverse, although a large number of respondents showed some concern.

In addition to that, the survey offers glimpses of the respondents' working experience, confidence in assessing their level of knowledge in AI, and their capacity to explain it to their senior or peers. The distribution of responses in these areas provide useful information regarding the degree of Lippit's theory comprehension and level of confidence from the respondents.

In the process of research Artifical intelligence discipline changed and developed in the important way. The roots of Generative AI could be traced from the mid of the 1950s when such concepts as machine learning (ML) and artificial intelligence began to emerge. The first generations of computing associated with the idea that machines could one day

become intelligent were established by IT masters like Alan Turing and John McCarthy who were critical for GenAI formation.

GMMs and HMMs were used earlier as the first forms of GenAI. Such statistical models are designed to generate sequences of datasets concerning inputs from humans such as time and speed. Other improvements succeeded in earlier forms of this concept through the development of other types of models like Variational Autoencoders (VAEs) and Restricted Boltzmann Machines (RBMs), which laid the basis and brought deeper complexity to generative models.

The use of cascaded layers of loosely connected computational nodes, or "neurons", which are able to process and learn from the data inputs, similar to how the human brain works, was only made possible by further development of the deep learning (DL) and machine learning in the 2000s, thus starting the general AI (GAI) trend. Neural networks can draw conclusion and decision on their own since they have been designed to look for patterns in huge data sets.

Nevertheless, it is the kind of neural network called Generative Adversarial Network or GAN invented by Ian Goodfellow and friends in 2014 that underlies the GenAI'S creativity. Based on the two neural networks that are built into the GANs structure, a discriminator and a generator that works to improve the quality of the generated data, GANs transformed the generation of images.

In addition, newer innovations such as Transformers that employ the usage of natural language processing (NPL), Variational Autoencoders (VAEs) and Recurrent Neural Networks (RNNs) started to flaunt AI generative creativity. The manner in which generative AI is applied in various fields has revealed just how creative reality can be, as the application generates contents that seem almost real.

By the help of the generative AI picture style transfer technologies as DeepArt and DeepDream, people can transform the ordinary pictures into incredible artworks to demonstrate the opportunities of the technologies. It has been electrifying the world recently to learn about the generative pre-trained transformer or GPT, especially ChatGPT-3, for its ability to write almost like anyone using simple prompts. This has risen some interest on the creativity of AI all over the world.

Generative AI pointed out as one of ChatGPT series creators, OpenAI, which has been funded by Elon Musk, has actively contributed to the advances and use of generative models. Until now GPT-1, GPT-2 and GPT-3 possessed rather phenomenal capability of language creation but none of all those created by GPT were as effective as created by GPT-4. The newest one claims to be even more creative and is described as stronger and more complex than the prior versions.

4.4 Conclusion

The adoption of Generative AI (GenAI) as part of learning frameworks constitute an optimal transformation in the manner in which learning activities are conceived and implemented. The results of the survey AI in Education reveal mostly positive attitude toward the AI applications, acknowledging specified effectiveness, cost optimization, as well as potential to contribute toward the improvement of quality of the educational tasks. But at the same time, it can be regarded as concerns about the organization's preparedness and the cost of integrating artificial intelligence.

Regarding the findings of our study, it can be stated that the emergence of GenAI, the neural network and GANs have shifted the facet of AI significantly. Starting from GMMs to HMMs and from the contemporary breakthrough invention of GANs, the AI has now reached tremendous potential with regard to synthetic human-like content and creativity.

As a result, such breakthroughs as OpenAI's GPT series are an excellent demonstration of the impact of GenAI offered in this paper. In general, GPT-3 and GPT-4, in particular, are examples of how AI achieved a new level of language generation that can be very diverse and even enjoy a high degree of humanity. Besides, such enhancements raise the awareness that AI is beneficial not only in educational context but also in various creative and professional spheres.

Nonetheless, the survey outcomes are crucial to investigate and expand on as they reiterate that further development in the field of technology does not guarantee the accomplishment of AI organizational readiness particularly when it comes to investment. With advancement of AI in all sectors, it is necessary for education sector specifically the universities to ensure that it promotes the use of AI in its broad processes while at the same time address the risks that comes with use of AI.

Thus, the development of GenAI can be considered as a major step in artificial intelligence which holds the potential to bring a positive change in the numerous spheres of our lives, education in particular. Therefore, by resolving the current issues and tapping into AI prospects, educational institutions could improve students' learning and achieve organizational effectiveness and innovation so they can be ready for a future in which AI takes a more prominent place in every learning institution.

CHAPTER V:

DISCUSSION

5.1 Introduction

This Chapter provides a detailed discussion of the research. The Headings which will be included in this chapter are Discussion of Results and the Discussion of various Research Questions, which need to be answered in this research.

5.2 Discussion of Results

Key Findings:

1. Perceived Benefits of AI in Personalized Tutoring:

The survey shed light on the uncontested recognition of the respondents concerning the revolutionary role of AI in the area of individualized coaching. Thus, one can conclude that the majority of individuals understand AI's ability to adapt the educational process to meet each person's personal interests and talents. The facets of Personalized lessons combined with immediate feedback were regarded as one of the chief foundations for improving the educational process. While this feature helps to meet the individual needs of students it also has a positive impact on developing the advanced insight of the subject. Also, the retention of information improves and motivation also increases, which points to the importance of AI in creating the environment that will lead to the best results in learning.

2. Virtual Tutors and Chatbots:

As for the effectiveness of virtual tutors and chatbots, respondents demonstrated a more complex attitude towards them despite they acknowledge their usefulness and availability. The respondents' unanimous preference for round-the-clock support and individualized descriptions of the changes stressed on the benefits of these AI-based tools that provided continuous support beyond the working hours. However, one issue of

controversy emerged about the boundaries of the emotional support and the lack of ability to substitute interpersonal communication. Such a dichotomy of responses indicates that despite the effectiveness of virtual tutors and chatbots in delivering efficient immediate academic assistance and support, stakeholders appreciate the human element as a unique approach to address some of the more sensitive issues that are essential for students' all-round development.

3. AI in Content Designing and Grading Systems:

The survey brought out a positive response towards the use of AI in designing and grading systems for contents. It was noted that AI held benefits in providing efficiency when it came to analyzing biometric data of students that would lead to the development of instructional materials to suit the performers. The ideas of automating grading processes were considered positive by the respondents, as this was stated more than once: it would dramatically change the educational processes. The approval of AI for these functions points to a general positivity towards applying it for improving the general result and effectiveness in the given educational organizations. Such beneficial outcomes in the teaching process indicate that the integration of AI into content generation and assessment will be promising in the future.

Analysis of Responses:

1. Level of AI Adoption in Educational Institutions:

Analyzing the results of the survey, it is possible to state that the educational institutions' use of AI is quite varied. Approximately 24. Three percent of the respondents said that their organizations had incorporated AI in some of the processes, thus demonstrating a level of adoption. Intriguingly, 18. 3% indicated no intention of implementing the Use of Artificial Intelligence in their institutions; the results depict a range of preparedness in the educational sector. Such a response also implies that the

process of weighing the possibilities of AI contribution to the improvement of educational processes continues, with some institutions being pioneers of AI, while others are still considering the possibility of its application.

2. Attitudes Towards AI in Learning Activities:

On the use of AI in learning activities, 82 percent of the respondents strongly agreed to the fact that AI can encourage more efficient learning. However, an interesting note was made of new issues connected with investment costs, which suggests variable preparedness concerning the large-scale deployment of artificial intelligence. Such a stance implies that there is some uncertainty about the role of finance that can be resolved only with an appropriate level of strategy, which would maintain interest in AI's potential and present practical concern for costliness.

3. Demographics:

- **Gender:** Concerning the gender distribution, the study involves predominantly male respondents – 82. 7%; this fact triggers some concerns about the gender-specific bias of the survey and invites the consideration of the corresponding issues in the further research. This could distort the outcome and hence the need for gender-sensitive survey methods when conducting the research.
- **Work Experience:** The majority of the respondents had more than 5 years of work experience, 55. 4% to be precise, which implies that the perception of AI integration is coming from highly experienced personnel. Meanwhile, 24. 3% symbolised new ideas, while 17% was in line with the actual experiences. 8% of the participants had 1-3 years of experience; therefore, the sample has fairly diverse experience levels.
- **Knowledge about AI:** Table 2 presented the distribution of respondents according to the knowledge they possessed on AI, 46% of the respondents complained that they were comfortable but not technical while 42%. Out of the respondents, 6% responded that they have elementary knowledge about AI. That shows a general

understanding of the AI concepts, which underlines the role of understandable and easy-to-use AI-based tools in the educational process.

4. Changes in Understanding of AI:

The respondents' beliefs concerning the changes in their perception of AI as observed in the past one year presented a wide range of views. Such fluctuation implies the active development and the necessity to study and experiment constantly as the application of AI technologies develops.

5. Statements Pertaining to Artificial Intelligence:

The participants generally understood that AI is capable of making fast decisions and can learn from occurrences. However, doubts were raised on the rationality part of AI as well as its capability to comprehend emotions. This kind of response shows that the author is a rational thinker, who understands the benefits of AI but at the same time sees its drawbacks, which helps to form a holistic picture.

6. Attitudes Toward new technologies and artificial intelligence

Concerning the attitudes towards new technologies and AI, the participants' sentiments are quite polarised. Thus, a majority of them trust in the ability of technology to raise life quality and personal productivity rates but have conflicting opinions on mobility, control, and early adoption. As with other questions, varied responses to technical support, system design, and dependence on computers and information technology reveal the subjects' diverse attitudes and individual circumstances.

7. Frequency of Using General AI-Based Products:

A considerable part of the respondents namely forty-four point six percent declared that they never used AI-based products, which points to the rather limited utilization of services in the general population among the respondents. This fact underlines the need to

address all the issues related to adoption and to design AI-based solutions to satisfy users' needs, so that the latter will use AI tools and technologies more actively.

8. Intention to Use AI Technologies in Learning Activities:

These positive attitudes that suggest the participants' agreement on the usefulness of AI in learning activities and willingness to endorse the use of AI in learning activities for other people points to the readiness to embrace the use of AI in learning activities. Such a positive attitude to the development implies the readiness to accept AI as a useful element of education.

9. Intention to Provide Personal Information to AI Applications:

Regarding the second research question, respondents were rather skeptical and unsure when it comes to sharing personal information with AI applications in the educational context. This conservative approach underlines the greatest significance of privacy issues and the necessity to develop effective security solutions to gain users' confidence.

10. Frequency of Using General AI-Based Products (Alexa, Siri, Grammarly):

The survey revealed that majority of the respondents occasionally used AI-based products; 51% of the time. 6% never used them. These differences of adoption degrees indicate the necessity to increase the awareness of AI's potential and to expand the understanding of the application of AI in people's daily lives.

Performance Expectancy

The perception obtained from the study has a positive attitude towards AI with a general consensus showing improved learning activities A majority of the users acknowledge the possibility of enhancing efficiency and effectiveness of their activities in education by means of AI. This optimism means that AI is considered as a useful instrument to improve the learning outcomes and optimise numerous activities in learning

contexts. However, there is certain level of concern and disagreement on how AI influence efficiency, cost, and quality. Such differences can be explained by experiences and the conditions for the use of AI. For example, AI is currently hailed for its ability to help save time ad minimize cost, but there needs to be a better demonstration of this on the ground. The varying beliefs about AI's impact on improving work quality and productivity reveal that although the community is aware of the benefits, a segment has not yet determined its worth and efficiency.

Effort Expectancy

As for the aspect of usability, people have a rather positive attitude towards AI technologies but still with certain concerns. The majority of the users perceive AI to be easy to use and easy to manage and this infers that most of these technologies are easy to master. However, certain users face difficulties when it comes to mastering AI solutions, which indicates the necessity to provide more extensive training for such programs. Also, the level of perceived difficulty in organizations' ability to adapt to AI depicts the challenges in deploying such technologies at a broader level. This proves that while the use of AI may be beneficial for learning the organizational change processes that are necessary should also be considered.

According to the result, management support and resources are highlighted as the key factors that may affect the implementation of AI. The degree of implementation is a function of support from leadership and access to appropriate resources in form of training and technical support among others. These are the aspects that can help eliminate barriers to the implementation and proper use of AI systems in learning institutions.

Social Influence

There is substantial social influence when it comes to the attitude people have towards the use of artificial intelligence. The support of peers and other authoritative

personalities play a vital role in individuals' decision to embrace and incorporate the AI technologies in their daily lives. This social support can increase confidence and motivation to change and facilitate the transition to AI. However, there are cultures that seem to be devoid of institutional support in various ways. For example, lack of adequate support from the institutional leaders and administrators; or inadequate training and assistance would act as barriers to AI implementation. This implies that individual and peer support is present, but there is a lack of institutional support and resource support about AI integration.

Facilitating Conditions

The survey results demonstrated different attitudes concerning the facilitating circumstances for AI in organizations. When the respondents were asked whether their organization possesses the right resources for AI, the responses were polarizing with a percentage expressing doubts in their organization's capacity to adequately support AI. This implies a fairly large degree of disparity in the Organization's preparedness to adopt AI technologies. Some of the respondents are quite confident of the availability of resources in their organizations while others are not very sure suggesting that there could be a need for the organizations to invest more in infrastructure and resources if they are to effectively support the integration of AI.

Still, the same is true for the attitudes toward organizational expertise in AI – there are positive and negative trends. A clear majority of the respondents are sure that their organization possesses all the necessary AI know-how; however, a sizeable portion of the cohort is still skeptical. Such differences show the need to build up specific expertise and solution application for proper gaps identification and AI effectiveness.

As for the knowledge needed to run AI, the overall sentiment of the respondents is rather positive, while still leaving a significant percentage of the organizations concerned.

This implies that as much as many organizations need the knowledge, there might be specific areas that may need training or reinforcement.

On the side of the management, there is an interest in AI, but this is also a rather ambivalent view. Slightly less than half of the respondents assume that management cares about AI, which is good news for generating AI-related activities. However, proportion of respondents is still a little indifferent or even skeptical about the level of management commitment. This means that even though there is some level of interest the support and implementation of AI may differ.

Technology Readiness

The findings of the survey concerning the willingness to adopt technologies support the general statement that the majority of the participants have a positive attitude toward the new technologies that improve the quality of life and provide people with more control and opportunities for mobility. As for the impact of technology in the personal context of the respondents, 44 percent of them stated that it provides efficiency, while 38 percent said that they seek advice concerning new technological solutions. From this, it can be deduced that there is a somewhat positive attitude towards technology and its application in people's lives.

However, according to the data, it is possible that some problems are linked to technology and its relevance in everyday life. Regarding the technical support, most of the respondents stated that it is, on average, subpar, and that technologies are developed without thinking of an ordinary user. This is particularly the case for an aspect that could be considered as a relative strength/weakness, namely the offer and design of technological products and services that might be more efficient and better suited to the users' needs.

Secondly, some of the beliefs expressed by the respondents suggest that they have diverse views on the impact of technology on people's relationships and the damage that

can be done by overuse of technology. Some of the respondents who expressed concern on the negative effects of technology on relationships and formation of dependency see technology as being very useful in today's society. The contrast of such perception is quite common where benefits and drawbacks of technologies are concerned and how they continue to present themselves in a cyclical manner.

According to a recent UNESCO9 report ChatGPT, launched in late 2022, became the fastest-growing app in history, bringing generative artificial intelligence (GenAI) into the public eye. These GenAI apps have created a stir because of their ability to mimic human capabilities and produce outputs including text, photos, movies, music, and software codes. GenAI is currently being used by millions of individuals every day, and there appears to be no limit to how the models can be modified to fit domain-specific AI applications.

Since these broad abilities to process information and produce knowledge mimic the higher-order thinking that forms the basis of human learning, they could have enormous effects on education. The ability of GenAI tools to automate some basic writing and art production tasks is compelling educational institutions and policymakers to reevaluate the what, why, and how of learning. In this new stage of the digital world, there are now crucial factors to take into account for schooling.

Undoubtedly, GenAI possesses an extensive array of potential applications. It has the ability to automate data processing and output display across all significant symbolic representations used in human thought. By providing half-completed knowledge products, it facilitates the provision of ultimate outputs. These recent advances of AI tools can have implications in defining human intelligence and learning because these tools free up humans from some varieties of lower order thinking tasks.

[9] https://www.unesco.org/en/digital-education/artificial-intelligence

The biggest impact that AI has made in education is the ability to automate most of the mundane tasks. Some of the administrative tasks such as course registration, attendance, and grading can be completed through use of AI. It is also believed that there are less important activities that teachers can perform more effectively due to the available time such as curriculum delivery and relating to students. AI is a promising solution to provide individualized learning too. Depending on the identified learning styles of students, the use of suggested learning material can be provided by AI-based algorithms. Research has shown that this type of differentiated instruction is effective in raising achievement because it causes students to be more eager to learn.

AI is also gradually being used to enhance the quality of teaching. In this case, data can be processed with the help of AI-based algorithms and provide teachers with actual recommendations concerning their further practice. AI can also be used to detect errors in student solutions and then advise the teachers on how best to correct the mistakes. Lastly, the management of educational institutions can be enhanced by AI. Institutions may make better decisions by using AI-driven algorithms to estimate student demand and optimize resources.

In summary, General AI has the potential to significantly impact education in several ways:

a. **Innovating Teaching and Learning Practices** AI can address some of the biggest challenges in education today, such as improving teaching methods and learning practices[1]. Stanford Institute's human-centered AI deliberations during their first AI+ business summit in April 2023 explored a central question: How can AI like this and other applications be best used to advance human learning?10 There were varied reactions from the illustrious participants. Graduate School of Education Dean Daniel Schwartz in his opening remarks emphasized that a lot of AI is also

[10] AI Will Transform Teaching and Learning. Let's Get it Right. (stanford.edu)

going to automate really bad ways of teaching. So [we need to] think about it as a way of creating new types of teaching. In addition, Technology offers the prospect of universal access to increase fundamentally new ways of teaching. The observations were both positive as well as cautionary in nature. One common theme was that AI will enhance personalized support for teachers at scale through various applications such as

- **Simulating students:** AI language models can serve as practice students for new teachers. According to Percy Liang, director of the Stanford HAI Center for Research on Foundation Models, said that they are increasingly effective and are now capable of demonstrating confusion and asking adaptive follow-up questions.
- **Real-time feedback and suggestions:** Dora Demszky, assistant professor of education data science, highlighted the ability of AI to provide real-time feedback and suggestions to teachers (e.g., questions to ask the class), creating a bank of live advice based on expert pedagogy.
- **Post-teaching feedback:** Demszky added that AI can produce post-lesson reports that summarize the classroom dynamics. Potential metrics include student speaking time or identification of the questions that triggered the most engagement. Research finds that when students talk more, learning is improved.
- **Refreshing expertise**: Sal Khan, founder of the online learning environment Khan Academy, suggested that AI could help teachers stay up-to-date with the latest advancements in their field. For example, a biology

teacher would have AI update them on the latest breakthroughs in cancer research, or leverage AI to update their curriculum.

However, the critical question asked by Professors is whether AI be a calculator in the classroom, or will it be a more detrimental tool. The participants of the seminar surmised that AI may raise the bar. The models won't be thinking about the students; rather, students will now have to edit and curate, forcing them to engage deeper than they have previously. Sal Khan of Khan Academy opined that it will allow learners to become architects who can pursue something more creative and ambitious. Professor Dora Demszky And Noah Goodman, associate professor of psychology and computer science, questioned the analogy, saying this tool may be more like the printing press, which led to the democratization of knowledge and did not eliminate the need for human writing skills.

b. **Enabling learning without fear of judgment:** Students in a live class often feel peer pressure and worry about being judged by their peers. But Ran Liu, chief AI scientist at Amira Learning, said that AI has the potential to support learners' self-confidence. While Teachers do encourage class participation by insisting that there is no such thing as a stupid question but most students, fear of judgment from their peers holds them back from fully engaging in many contexts. As Liu explained, children who believe themselves to be behind are the least likely to engage in these settings. Interfaces that leverage AI can offer constructive feedback that does not carry the same stakes or cause the same self-consciousness as a human's response. Learners are therefore more willing to engage, take risks, and be vulnerable.

One area in which this can be extremely valuable is soft skills. Emma Brunskill, associate professor of computer science, noted that there are an enormous number of soft skills that are hard to teach effectively, like communication, critical thinking, and problem-solving.

With AI, a real-time agent can provide support and feedback, and learners can try different tactics as they seek to improve.

c. **Improving learning and assessment quality** According to Bryan Brown, professor of education, said that AI has the potential to support a single teacher who is trying to generate 35 unique conversations with each student. Stanford Digital Economy Lab Director Erik Brynjolfsson and Candace Thille, associate professor of education and faculty lead on adult learning at the Stanford Accelerator for Learning, attendees noted that the inability to judge a learner's skill profile is a leading industry challenge. AI has the potential to quickly determine a learner's skills, recommend solutions to fill the gaps, and match them with roles that require those skills.
d. **Is Gen AI is Promethean11 The moment for learning?12:** Pometheus according to Greek mythology stole fire from the gods and gave it to humans. We all know what the fire is capable of and what damage it can do if not contained within limits. This in one line summarizes what Gen AI can do for students' learning process. Yet Thomas L. Friedman in his 2023 article in NYT writes after witnessing the ChatGPT 4 Demo by Craig Mundie, the former chief research and strategy officer for Microsoft, the first thing that came to his mind was the observation by the science fiction writer Arthur C. Clarke that "any sufficiently advanced technology is indistinguishable from magic." According to him, this Promethean era is "The Age of Acceleration, Amplification, and Democratization." Much more true for students' learning context.

As educators we all want our students to bring about critical thinking while learning. They need not just cram what is a fact but develop abilities to interpret it in a new context. Gerald

[11] Promethean Definition & Meaning - Merriam-Webster accessed 2201 2024
[12] Opinion | Our New Promethean Moment - The New York Times (nytimes.com) accessed 22012024

Graff and Cathy Birkenstein authors of the highly successful book They Say I Say that students will never learn on their own to make the key intellectual moves that their templates represent which seasoned writers pick up unconsciously through their reading. In the context of generative AI/ChatGPT provides precisely these constructs having been trained on billions of words to facilitate the communal, dialogical nature of research and argument giving students both practical and supernatural aspects without having to read billions of words and even plan to. ChatGPT produces clear, accurate prose without making any grammatical errors. Instead of basing its rhetorical decisions on the experiences of individual users, ChatGPT models surface-level rhetorical decisions from human writers who have received instruction in school rhetoric.

A working paper[13] from the Massachusetts Institute of Technology describes an experiment the researchers did recently with 444 "college-educated professionals" who were assigned a "midlevel professional writing task," such as crafting delicate emails or news releases. Half received ChatGPT, whereas the other half did not. With ChatGPT, participants wrote more effectively, finished the assignment faster, and expressed greater enjoyment. Perhaps more importantly, ChatGPT assisted "low-ability workers," which means that those with less proficient writing abilities but maybe strong ideas could still do the assignment successfully. ChatGPT facilitates this division by disentangling thought and writing. Students think to let the computer write. With its arbitrary norms and expectations, ChatGPT highlights the harsh limitations of school rhetoric—a machine is capable of producing language that both pleases and fools the teacher. However, a student's ideas stay with the student, free from the teacher's recommendations, critiques, and corrections.

[13] Noy_Zhang_1.pdf (mit.edu) accessed 22012024

Intention to Use AI

The survey results are diverse in terms of the respondents' opinions regarding the usage of AI technologies for learning activities, where they are both positive and negative. About half of the respondents express a high level of readiness to use AI in learning activities. A majority expressed concern about the prosaic issue of discussing and employing AI technologies, which reveals an overall positive attitude toward utilizing these tools in education. Such enthusiasm implies an understanding of the positive impact of AI on the learning experience and the achievement of educational objectives.

But at the same time, the survey indicates that there is quite a lot of indecision and distrust. A significant portion of the participants are still unsure or even negative about the implementation of AI in their learning processes. This mixed sentiment can be interpreted as a certain amount of ambiguity or dubiousness as to whether current AI solutions are suitable for use in the classroom. Such factors that may contribute to this uncertainty may be the reliability of the AI, the current available AI, or the extent of understanding of the role of AI in learning.

The future perspective on the use of AI in organizations shows a wide variety in the expectations of the concept. This is a representation of some of the respondent's optimism about the regular use of AI in their organization; however, others remain skeptical. This variation implies that, as much as there is potential in AI, the integration process may encounter some difficulties or is not welcomed by all.

As for the overall attitude of the respondents about the discussion and recommendation of AI for learning activities, the attitude is predominantly positive. Most are ready to tell only the positive things about AI and call for its implementation in learning environments. This suggests a readiness to market AI and inform others what good has been brought about by the technology. However, there is still a group of respondents who

are indifferent or skeptical, which may indicate discussions or doubts regarding the prospects of AI and its efficiency.

Discussion of Research Question One: What are the antecedents impacting the adoption of AI by the participants of higher educational institutes in India?

From the survey that was conducted among participants in higher educational institutes in India and based on the response data collected about the adoption of AI, it is possible to identify several key antecedents that influenced participants' decision-making and their perception of AI technologies. These antecedents can be grouped into a range of factors that influence the adoption process namely perceived benefits, perceived concerns, and perceived organization readiness.

Perceived Benefits and Enthusiasm for AI

One of the most potent prerequisites for the use of AI systems is the perceived usefulness of AI in learning processes. The results reveal that the majority of participants showed a positive perception toward using AI in their learning endeavors. Most of the respondents express their willingness to achieve the potential benefits of AI like, the improvement of learning outcomes, tailored learning support, and optimization of learning activities. This enthusiasm is a strong motivation for adoption since participants who understand the potential impact of AI are encouraged to adopt these technologies to improve their learning.

Personalized learning is one of the key benefits of AI in the classroom, in my opinion. AI-powered teaching tools can evaluate student performance data and offer customized assistance to help students raise their grades.

Moreover, AI is capable of quick feedback. For instance, through the use of artificial intelligence in teaching, students can get results of their work instantly thus helping them identify errors made and rectify them.

The ability of AI to reduce repetitive work is another advantage of AI as it is seen from the following point. It may identify tests and assignments, resulting in less time-consuming work for teachers on other activities like lesson preparation and providing individual time to each learner.

There is a limited number of AI applications that are being incorporated into the improvement of learning in professional or academic spheres. For example, Ahura is an AI-based learning companion that tracks learning behaviors and levels of engagement. Through the application of the Knewton adaptive learning system, students can learn in the firm individualized setting. Querium is an AI-based learning companion that generates lesson plans for each learner and solves math problems with every learner in detail. Specifically, ALEKS is an artificial intelligent-based learning environment for students, in which it provides different learning paths by each student's strengths and weaknesses.

With the use of artificial intelligence (AI), Carnegie Learning provides students with a personalized math tutoring experience based on their performance. Additionally, Smart Sparrow enables people to offer constructive criticism that is specific to each learner. Ultimately, Gradescope is an AI-driven grading tool that streamlines the grading process, freeing up teachers' time to give each student more individualized attention.

These are but a handful of the AI tools that can be used in the classroom. It is crucial to remember that these resources should support educators rather than take their place in the classroom.

Skepticism and Concerns

However, there is also some uncertainty and negative attitude of the participants concerning the usage of AI. These doubts can be explained by such factors as the efficiency of the AI application, the quality of modern AI solutions, and fears that AI can replace traditional learning methods. Those who show concerns can be reluctant due to prior

adverse experiences with the technologies, not being acquainted with AI systems, or, the moral consequences and data protection issues linked to AI systems.

Because they think AI will automate their occupations and render them obsolete, some educators may view AI as a danger to their careers. However, it's crucial to remember that AI is designed to support educators, not to take their place. AI should be developed and applied as a tool.

The expense of creating and deploying AI-powered teaching tools is one of the drawbacks to take into account. For educators and educational institutions that require additional funding to invest in AI technology, this can pose a serious challenge.

Using AI-powered educational resources also deprives pupils of emotional support and human interaction. Artificial intelligence (AI) can offer instantaneous feedback and individualized learning, but it cannot take the place of the human and emotional support that students require to thrive. Relying too much on AI-powered educational technologies may have detrimental effects on students.

AI in the classroom is also constrained by privacy issues. There are privacy and security concerns around the potential collection and storage of sensitive personal data by AI-powered educational systems.

In his master's thesis, Remian's14 Seventeen terms and common concerns were identified while using AI in education as shown in Figure 2

[14] Remian, Dana, "Augmenting Education: Ethical Considerations for Incorporating Artificial Intelligence in Education" (2019). *Instructional Design Capstones Collection*. 52. https://scholarworks.umb.edu/instruction_capstone/52

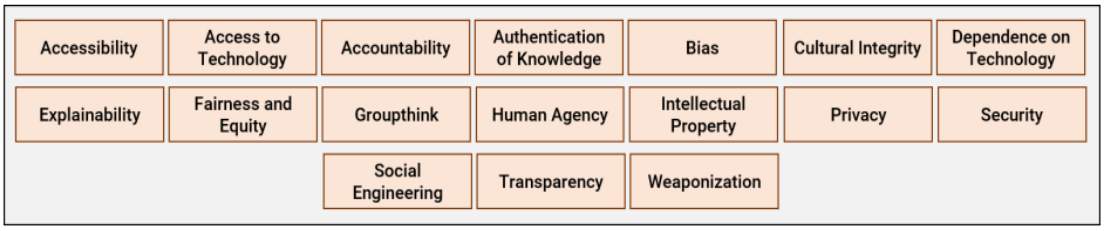


Figure 5.1: Seventeen ethical concerns adopted from Remina 2019

Perhaps the most important area of ethics in AI is privacy (Stahl & Wright, 2018). Protection of sensitive personal data is a top concern for current laws and norms, to guarantee that privacy is protected by law and integrated into AI by design (Stahl & Wright, 2018). With numerous revelations regarding the scope of data access and breaches by Technology firms, there is a lot of public awareness and zeitgeist surrounding this topic. The basic availability of Permitting access to potentially sensitive data is necessary for many internet services. Possibly as a result of this, there's a belief that younger generations are more inclined to forfeit their privacy, However, some data suggests that younger generations are more concerned about privacy than previous generations. Generations (Dubois, Blank, & Bolsover, 2014). Nonetheless, data is an economically significant resource, and having sufficient access to data is a necessary condition for creating and enhancing AI (Gilliard, 2018). Among the most lucid the conflict between privacy and effectiveness is a problem in AI ethics. The use of machine learning enables the processing of massive volumes of data, and data access is what makes it possible for the creation of AI models with pertinent uses (Zimmerman, 2019; Whittlestone et al., 2019). There are potential increases in privacy when a certain amount of data privacy is given up. Precision and effectiveness in AI (Zimmerman, 2018). This is particularly ev/ instances of medical diagnostics. Permitting the use of private diagnostic data to develop AI models for the benefits of diagnosis and treatment are obvious, but privacy must be given up first. Nowadays, a lot of firms that gather data promote consent as a safeguard. Personal

information, particularly for medical purposes (Dare, 2019). But the effectiveness of consent is Probably not. According to Jones, Kauffman, and Edenberg (2018), "intentionally or not, the A user's options are obscured by complicated terminology and the opaque nature of many privacy regulations (p. 68). Although informed consent is a valuable tool, the few obstacles that service consumers must overcome, usually a checkbox indicating acceptance of a lengthy terms and conditions document signature on a form at a doctor's office, or a document hidden behind an additional link on the internet, do not represent a genuine act of informed consent. The enormous quantity of items is numerous Because of "consent," anyone who provides their permission may automatically contribute to consenting desensitization (Jones et al., 2018, citing Schermer, Custers, and van der Hof, 2014).

Giving automatic and moot permission transforms a crucial instrument into a means of weakening human willpower. Coercion renders consent to privacy unenforceable if it is a prerequisite for obtaining education. Give additional consent. This is made worse by worries about surveillance as well as the possibility that data from AI systems utilized in public schooling could be subject to federal supervision and examination.

- **Privacy concerns** can sometimes be a sign of deeper prejudice concerns. Accountability, safety, monitoring, and openness as well; these topics are deeply entwined. Dare (2019) provides the example of sexual orientation, where privacy is not the real issue, but rather protecting oneself against prejudice brought on by cultural norms about sexual orientation; in this instance, the individual does not benefit from this privacy and can obstruct the provision of pertinent medical services. Given that data does have economic value, concerns about data ownership and use turn into issues of justice and openness as much as privacy issues, particularly in the classroom. It makes sense that privacy concerns could come up.

Still, by making the data anonymous and addressing privacy concerns by just providing the advisors of the students with the predictive outcomes? (Gilliard, 2018). If the related issues are resolved and safeguards against the unjust use of data are in place, maybe privacy won't be as important. Dare (2019) continues with the remark, "We consider that confidentiality to be reasonable and significant, but it's unclear if we are appropriate" (p. 6). However, while AI has been applied to law enforcement and even prediction policing: If students feel watched, can they still feel safe? Particularly for disadvantaged populations, data analysis might reinforce the dangerous monitoring and power frameworks that Foucault mentioned when talking about how he came up with the panopticon (King, 2013).

Responsibility This focuses on the concept of responsibility, specifically in relation to the identification of errors, shortcomings, or harm. Although it may be tempting to attribute blame only to the AI, it is crucial to acknowledge that the AI is not more culpable than any other software program. Owing to the misperception that AI is This inclination, albeit partially understandable due to its intelligence and autonomy, ultimately leads to Users' and developers' "de-responsibilization" (de Saint Laurent, 2018, p. 742). In Allen's case, According to Wallach and Smit (2006), "an autonomous system that carelessly causes harm might not be ethically culpable, any more than a toaster that catches fire can be held accountable for its own actions", but that abstinence from accountability does not address mistakes, shortcomings, or injury. Even in this clarification, there can be uncertainty and fear around the meaning of autonomy for machines differ. Although they are capable of doing so, autonomous machines are not yet endowed with the self-interest or free choice that a sentient animal exhibits (Johnson & Verdicchio (2017). De Saint Laurent (2018) believes it is the duty of individuals who develop We need to hold the AI and those who choose to use it accountable. All of this is additionally complicated by AI's current

incapacity to communicate with itself or be understood. Here, there is a chance that While AI might be detrimental to students or educational institutions, the final logic or The damaging action or inaction's cause may not be discovered, allowing the person who was affected to suffer in the absence of any available remedy or correction. Global norms, like those steps to increase accountability, are included in the ACM and ISO's output, yet there are problems regarding accountability that cannot be adequately addressed by businesses that rely solely on self-policing. Monetary interest in the subject (Katyal, 2019). The conflict between financial responsibility and interests is prevalent in the majority of institutional management tasks, and AI is not exempt from these worries. One of the main issues with accountability, as raised in this paper and in the literature provides proof of prejudice in AI programs.

- **Prejudice** The bias generated by or represented by algorithms is the main topic of debate here. Both machine learning and human comprehension are inherently biased. As mentioned by Academic Jan Willem de Graff (2019) asserts that data is inherently a restricted "reflection" or measurement of a restricted area of the real world. It is, in essence, biased all the time (p. 18). The forecasting abilities developed in Machine learning models can detect biases in data sets and in people, and they can convey them through their products. In fact, these prejudices could manifest even in cases where the original bias was unintentional and the model was unaware of it (Stahl & Wright, 2018). An illustration of this is realizing that gender may be assigned by Google Translate along with stereotypes in translating gender-neutral terms (Miller, Katz, & Gans, 2018). This is a quantifiable metric rather than a qualitative choice made by Google Translate. The Data indicates that this is how language is most frequently used, so the model takes advantage of it. In light of that. The same fundamental dynamic describes how an AI program is designed to

assist in pre-screening In the event that it was trained, candidates for an engineering position might give preference to male applications. Primarily with attractive masculine role models. In situations such as these, or in policing and Prejudice issues in criminal justice have important ramifications. Even in situations where these models do not make any overt mention of a person's gender, race, or other legally protected classes Because the absence label is secondary to other patterns and qualities, prejudice may develop. These auxiliary Referred to as proxy attributes are attributes (Katyal, 2019; Kim, 2018). When a characteristic is principally connected to a particular demographic, such as extracurricular pursuits more closely gender relative to another, postal codes for regions where a higher percentage of a particular socioeconomic group, ethnicity, or truancy risk factors based on historical data that overrepresents a particular group, then prejudice might persist as a result of that characteristic. Bias in algorithms found in current systems, such as ads for high-paying jobs that prioritize men over women or crime prediction software that highlights specific small infractions that warrant police attention (Guersenzvaig & Casacuberta, 2019). While bias in AI training can be accommodated, it must first be identified and taken into consideration. Given that AI can't now explain why it makes the decisions it does, this watchfulness and Planning are essential from the start to prevent damage from occurring. Miller and associates (2018) suggest a number of tactics to combat prejudice, such as educating parties about awareness engaged in oversight, inclusivity, training methods, and grievance-airing procedures. Different techniques that can be used to rectify bias include more instruction and reinforcement of the positive results of the model (Kose, 2018). But because prejudice can originate with people, It's possible that inclusion and awareness-raising won't be sufficient to eradicate all bias. The

algorithms created for artificial intelligence (AI) can adapt to people and are made up of "opinions embedded in code" (Raub, 2018 quotes Mann & O'Neil, 2016). There is still much to learn about implicit prejudice in humans before we can address its integration into AI more thoroughly (Katyal, 2019).

- **Safety** Concerns around weaponization, social engineering, and privacy are heightened. When security concerns are taken into consideration. Numerous data breaches and security culture failures have made headlines in the past several years, and they can be used as a tool to enhance security, a means of impeding security, and a conduit for security breaches. Although AI can be It can also be trained to enhance defensive capabilities and strengthen cybersecurity processes. Aggressively to strengthen attempts to evade security (Darraj, Sample, & Justice, 2019). The creation of instruments to support security initiatives is in rivalry with the instruments to counter such attempts and vice versa. Given this, the significance of this interaction is evident. Quantity of data that AI is subjected to. Sensitive data is protected under current laws in numerous nations, but more preventative action is required. One may also be concerned about weakening or compromising AI itself. Wherever AI is employed AI itself may be used for a range of objectives, including operational tasks. Interference from parties attempting to harm or undermine an organization's work. Furthermore, to systems, it is possible to undermine systems by offering "adversarial examples." (Page 189 of Kose, 2018). Data used to refute the current AI model is known as adversarial data, and it can be employed for beneficial purposes, but threat actors may also utilize it to mislead or reroute the model Kose (2018). Should threat actors be able to have substantial access to the educational models, Possible outcomes include disinformation and social dynamics manipulation.

- **Equity and Fairness** The concerns of accessibility, bias, and equity are closely related to each other. The ability to use the required technology. A system that exhibits considerable bias or that is incapable of being egalitarian and accessible to all, which is why such debate topics exacerbate this problem. Furthermore, a recurring subject in the last question on the questionnaire was participants expressing worry that business interests are prioritized over students' needs. Need to Although AI schooling is successful and profitable, experts are concerned that underprivileged educational systems might rely too much on AI at the expense of less presence of a live teacher (Santry, 2018). Although the possibility of using AI in education seems important if this possibility only helps a select group of students and not others, the danger of processing massive volumes of data, and it is this data accessibility that enables the creation of artificial intelligence models with pertinent applications (Whittlestone et al., 2019; Zimmerman, 2018). A certain amount of data privacy must be given up in exchange for the possibility of future gains in the precision and efficiency of AI (Zimmerman, 2018). This is especially evident in instances where diagnostics in healthcare. Permitting the use of private medical data to train artificial intelligence model tools, service users should only encounter the barest of obstacles.

- **Liability** focuses on accountability in terms of identifying mistakes, shortcomings, or injuries. Blaming the AI directly is too simple and alluring, but it's important to remember that the AI is not greater responsibility than any other software program. An autonomous system that carelessly causes harm might, as noted by Wallach and Smit (2006), neither ethically culpable nor justifiable, any more than a toaster that catches fire can be held accountable" (p.13), yet assigning blame in this way doesn't make mistakes, failures, or harm disappear. Even in this situation clarification,

uncertainty and uneasiness may arise as to the meaning of autonomy for machine types differ. Although they are not yet capable of doing so, autonomous machines endowed with self-interest or free will displayed by an intelligent animal (Johnson & 2017's Verdicchio).

Organizational Readiness and Support

The willingness of higher educational institutions in the adoption process is also an important factor in the adoption level of AI. Thus, the results of the survey indicate the fluctuating levels of confidence regarding the integration of AI in the future of organizations. The study also elucidated that participants' perceptions of the readiness of their institution to embrace AI technologies can influence their readiness to utilize the tools. The study also found that institutions that show intentions on how they plan to integrate AI into their educational systems, provide adequate training for the participants, and make available the needed resources have an added advantage in the encouragement of AI among the participants.

Neutral and Mixed Attitudes

A significant portion of participants have a neutral or even a slightly negative view towards the use of AI. This group is receptive, and it also has skeptics within it as well. Such responses suggest that people are still unsure about how AI can be used in education and/or what the long-term consequences of such technology will be. These participants may be aspiring for more evidence of AI efficiency or possibly, they would like to observe other successful AI uses before going all out for AI solutions. The above issues and their explanations might help change the neutral attitudes toward the positive adoption of AI.

Influence of Peer Opinions

Concerning the key reasons for the adoption of AI, the results also present information about the impact of peer opinions on the use of AI. A supportive environment that can

facilitate adoption is expressed by participants who are likely to discuss AI positively and recommend its use to other people. On the other hand, the people who are less willing to recommend AI or to express positive opinions about it may have some influence on others and induce them to be more skeptical or careful.

Future Outlook and Organizational Trends

Some of the trends from the broader research study can be understood from the participants' expectations of future consistent use of AI in their organizations. The opinion about the constant increase in the usage of artificial intelligence indicates positive expectations and willingness to accept innovative solutions in the future. This outlook can result in the proper usage of AI technologies and the promotion of innovation within educational institutions.

The precursors that affect the use of AI by the participants in higher educational institutes in India include perceived advantages and risks, institutional preparedness, and perception from other people. Although there is a lot of interest and awareness of AI and its benefits, there is still some level of skepticism and doubts regarding effectiveness and implementation issues. In order to counter these issues, increase the level of support from the organization, and show the effectiveness of AI applications in practice, it is high time to develop AI technologies in higher education.

Discussion of Research Question Two: Does an individual's technology readiness moderate the relationship between components of the Unified Theory of Acceptance and Use of Technology (UTAUT) and behavioral intention to use AI in Education (AIED)?

Implications of the study indicate that technology readiness is a strong moderating factor in the relationship between the components of UTAUT and the subject's behavioral intention to use AI in Education (AIED). This interaction shows that the readiness for using technology differs and therefore determines the users' attitude towards AI technologies in

learning.

Technology Readiness may be defined as an individual's predisposition to accept or reject new technology based on his/her optimism, innovativeness, discomfort, or insecurity toward technology. This paper establishes that, in fact, there is an interaction between the elements of the UTAUT model such as Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions, and the readiness towards technology plays a significant role in determining the extent to which intention to use AIED will be impacted. Performance Expectancy which is defined as the degree to which the use of AI is perceived to enhance learning outcomes is positively influenced by moderated by the extent of technology readiness, where those with a high level of technology readiness are perceived to have a stronger positive association with Performance Expectancy. Such people are more likely to consider AI as a helpful tool when it comes to increasing the effectiveness of educational processes because they have only positive perceptions of technology. They are more confident with AI's benefits, which enhances their intention to use AIED. On the other hand, low T-RIS users may have performance expectancy doubts or perceive AI technologies as ineffective hence a weak link between PE and AI technology Intention.

The next factor that has been identified is the Effort Expectancy which addresses the perceived usefulness of AI technologies and is affected by the technology readiness. The technology readiness of a person refers to the extent to which a person is willing to use technology interfaces and this kind of person will always find it necessary to use AI tools since they find them easy to use. This increased ease of use perception further strengthens the positive link that Effort Expectancy has with their intention to use AIED. On the other hand, low T-READ may hinder the understanding and application of AI technologies by the users, reducing the strength of the link between Effort Expectancy and the users'

intention to use AI. This results in the opposing attitude of the consumers, resistance, or hesitation towards the adoption of new technologies.

Social Influence which measures the extent to which the decision to use AI is influenced by other people's opinions and recommendations is again conditioned by technology readiness such that people with high technology readiness are likely to be influenced positively by social endorsement. This increases the reception of messages on the benefits and utility of the technology hence increasing the association of Social Influence and their willingness to use AIED. However, those with low TRC may not be as affected by social recommendations because of their reluctance or resistance to using new technologies thus, reducing the impact of the Social Influence on their adoption intentions.

Facilitating Conditions, which again include the availability of resources and the support for AI use, are related to technology readiness in a way that the latter makes it easier for individuals to utilize these resources effectively. The more the students are ready and comfortable to embrace new technologies, the more they are likely to perceive the support structures in place positively thus strengthening the Facilitating Conditions and the students' intention to use AIED. On the other hand, the low t-TRC may pose a problem in accessing or using the available resources and hence, reduced Facilitating Conditions and their intention to adopt AI.

In summary, technology readiness plays a moderation role in concerning the relationship between the five components of the UTAUT model and the intention to use AI in education. There is a significant interaction between HI-TECH-READINESS and the four technology acceptance factors, which makes the positive impact of Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions stronger on the behavioral intention of adopting AI technologies. On the other hand, low technology readiness may have negative impacts on those relationships, and thus, lowers the adoption intentions.

Based on this insight, it is clear that educational institutions and policymakers should design interventions to address technology readiness in terms of promoting positive attitudes toward technology and overcoming barriers of certain individuals who are technologically phobic. Promoting technology adoption readiness can help close gaps in adoption and can also help to improve the successful implementation of artificial intelligence in learning environments.

Discussion of Research Question 3: Does an individual's knowledge about AI moderate the relationship between components of UTAUT and behavioral intention to use AI in Education (AIED)?

The analysis results show that an individual's awareness of AI strongly mediates the relationship between the proposed UTAUT components and their behavioral intention to use AI in Education. It is against this backdrop that this relationship highlights the need to know how an individual's awareness of AI technologies determines their usage pattern.

The Performance Expectancy relates to the perceived gains that are likely to be achieved through the integration of AI in education including; enhanced learning achievements and effectiveness. Those who have greater knowledge about AI should have a better appreciation of how AI could address their educational needs and that further supports their positive beliefs on performance. Due to such knowledge, they are able to perceive and visualize how the tools of AI can complement their academia leading to a stronger positive relationship between PE and their intention of using AIED. On the other hand, those with lower levels of knowledge may not be as certain regarding the efficiency of AI tools hence, producing a lower correlation of Performance Expectancy with their willingness to embrace the technologies in question. Based on the analysis, they argue that there are probably many people who are not knowledgeable about AI and hence they might not endorse AI as they have doubts about its usefulness.

The first of these is the effort expectancy which concerns the degree of perceived effort to use AI technologies. Another group of beneficiaries of such knowledge is the learners who have higher AI knowledge since they also get to learn about the existing AI tools and how they can easily use the tools in order to do away with the perception of difficulty. This in turn results in a stronger positive relationship between Effort Expectancy and their intended use of AIED. On the other hand, the less informed may perceive the tools as being complicated or too tiresome hence impacting their perceived ease of use and hence their use of AI. The present study finds that the lower the level of exposure to AI the higher the extent of overestimated effort for its adoption, thereby lowering the intended adoption further.

Social Influence captures the effect that social pressure or recommendation from peers, tutors or other socially influential individuals have on a person's decision to utilize AI. Educated people are in a position to appreciate and consider social cues with regard to the usage of Artificial Intelligence since they may appreciate the social significance of the recommendations. This leads to the enhancement of the positive correlation between Social Influence and their actual use of AIED. On the other hand, the participants with little knowledge about AI might be less sensitive to Social Influence because they may not understand the significance or benefits as described by others hence, reducing the correlation between Social Influence and their intended adoption. The findings point to the conclusion that understanding social influence as a brand depends on the recipient's AI knowledge to properly interpret and respond to such endorsements.

Facilitating conditions are related to the presence of the prerequisites that are required for the implementation of AI. The amount of knowledge about AI influences the ability to use resources and supports that are at one's disposal. Their level of AI awareness enables them to overcome obstacles and effectively manage resources, thus improving the correlation

between Facilitating Conditions and their intention to use AIED. On the other hand, the less informed person may have challenges in getting or utilizing these resources hence reducing the intensity of the Facilitating Conditions – adoption behavior linkage. The findings further show that if one has no knowledge about AI, then one will not be in a position to fully utilize the available support structures to his/her advantage and therefore the intention to adopt AI.

Thus, it is proposed that an individual's knowledge of AI is a significant moderator in the adoption process. It influences the interaction between Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions, regarding the usage of AI in learning contexts. The greater the level of AI knowledge, the more positive the impact of these UTAUT components on the adoption intention, the lower the level of AI knowledge hinders or reduces these effects. This is why it is crucial for educational institutions and their stakeholders to increase AI literacy and disseminate the necessary information to potential adopters allowing for the effective implementation of AI technologies in education. Therefore, enhancing knowledge about AI can assist institutions in closing the gap between the perceived advantages of the technology and the implementations of the same.

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APPENDIX:

LIST OF MEASUREMENT ITEMS

Construct (References)	**Scale items**
Performance Expectancy (Venkatesh *et al.* 2003; Wong *et al.*, 2020)	Using AI enables me to accomplish my **learning activities** more efficiently and effectively Using AI saves my time and reduces costs in **learning activities** Using AI increases the quality of my work in **learning activities** Using the AI system increases my productivity in learning activities.
Effort Expectancy (Venkatesh *et al.* 2003; Wong *et al.*, 2020)	It is easy for me to become skillful at AI technologies in **learning activities** I would find the AI system easy to use for my learning activities. It is easy for my organization to migrate to AI Management support is important for the implementation of AI Investment cost is a primary concern for my organization to consider AI
Social Influence (Venkatesh *et al.*, 2003; Park, Hong and TPM Le, 2021)	People who influence my behavior think that I should use AI in my learning. People who are important to me think that I should use AI in my learning People will use AI for learning activities. People will be cooperative in using AI for learning activities
Facilitating conditions (Venkatesh e*t al.*, 2003; Wong *et al.*, 2020)	My organization has the right resources for AI My organization has the expertise for AI in case technical assistance is required My organization has the knowledge necessary to operate Ai The management has expressed interest in AI
Technology Readiness (Parasuraman and Colby, 2015; Flavián *et al.*, 2021.)	*Optimism:* New technologies contribute to a better quality of life Technology gives me more freedom of mobility Technology gives people more control over their daily lives Technology makes me more productive in my personal life *Innovativeness:* Other people come to me for advice on new technologies

	In general, I am among the first in my circle of friends to acquire new technology when it appears I can usually figure out new high-tech products and services without help from others I keep up with the latest technological developments in my areas of interest *Discomfort*: When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do Technical support lines are not helpful because they don't explain things in terms I understand Sometimes, I think that technology systems are not designed for use by ordinary people There is no such thing as a manual for a high-tech product or service that's written in plain language *Insecurity:* People are too dependent on technology to do things for them Too much technology distracts people to a point that is harmful Technology lowers the quality of relationships by reducing personal interaction I do not feel confident doing business with a place that can only be reached online
Knowledge of AI (Zerfass, Hagelstein & Tench, 2020)	How knowledgeable are you about AI? ● I have no idea ● I am familiar with the AI basics ● I am comfortable with what it means but I am not technical ● Very comfortable. I work with AI. Which of the following statements hold true pertaining to artificial intelligence? • Decisions and actions by software-driven agents • Learning from experience • Computer-assisted activities by humans • Adapting to changing goals and unpredictable situations • Processing natural language • Understanding emotions • Owning to all human abilities

	• Experiencing feelings
Intention to use AI (Venkatesh *et al.,* 2003; Park, Hong and TPM Le, 2021)	I am considering using AI technologies in my **learning activities**. I will use AI technologies when performing **learning activities** as a student. I predict that our organization will use AI on a regular basis in the future I will talk positively about AI for learning activities in the future I will recommend AI for learning activities to others in the future