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Navigating the Technology Divide: The Role of Educational Leadership in Generative AI Usage among Diverse Age Groups

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Abstract

This study investigates how the ages of Yemyung Graduate University (YGU) students influence their perceptions and usage of generative AI tools, examining factors such as frequency of use, ease of use, and anticipated future interactions with these technologies. Utilizing a quantitative research design, the study surveyed a diverse sample of students, revealing significant differences in perceptions based on age. Findings indicate that younger students tend to view generative AI tools as essential for academic success, whereas older students often perceive them as less critical. This disparity suggests that educational leadership must prioritize targeted training and support initiatives tailored to the unique needs of older students to bridge the technology divide. By integrating generative AI tools into the curriculum and promoting peer mentorship programs, educational leaders can foster an inclusive learning environment that empowers all students to effectively utilize these technologies. The implications for academia emphasize the need for tailored support, while policy recommendations call for equitable access to resources that enhance digital literacy among diverse age groups. Furthermore, the study identifies avenues for future research to explore the long-term effects of training interventions and cultural influences on generative AI adoption. Ultimately, this research highlights the crucial role of educational leadership in addressing disparities in technology engagement, ensuring that all learners benefit from advancements in educational technology.

Keywords

Generative AI, Age, Technology Adoption, Academic Performance, Ease of Use, Educational Leadership

1. Background

The growing use of artificial intelligence (AI) tools in higher education is transforming learning experiences and teaching methodologies globally. AI technologies, such as automated grading systems, personalized learning platforms, and research assistance tools, have demonstrated the potential to significantly enhance student outcomes by streamlining administrative tasks and offering customized learning experiences (Zawacki-Richter et al., 2019). However, how students engage with these technologies can vary, particularly when considering the impact of age on their frequency of use, perceived ease of use, and future responses to continuous AI adoption. This study aims to examine how age influences the usage of generative AI tools among students enrolled in Yemyung Graduate University (YGU).

Studies on technology adoption frequently reference the Technology Acceptance Model (TAM), which posits that perceived usefulness and perceived ease of use are critical factors influencing users' readiness to adopt new technologies (Davis, 1989). Age plays a critical role in influencing these perceptions. Younger students, commonly referred to as "digital natives," have been exposed to digital technologies from an early age, making them more adaptable to AI tools compared to older students (Prensky, 2001). In contrast, older students, who may have entered higher education before the widespread use of digital technologies, may encounter challenges in using AI tools effectively. These students often require more time and support to develop the confidence and skills necessary for adopting new technological innovations (Scherer et al., 2019).

This is where educational leadership becomes crucial. Leaders in educational institutions play a vital role in creating inclusive environments that promote digital literacy and facilitate the effective use of AI tools among all students, regardless of age. By implementing targeted training programs, mentorship opportunities, and resources tailored to different age groups, educational leaders can help bridge the technological divide and enhance student engagement with AI technologies.

The demographic composition of YGU's international leadership program presents a unique context for exploring this dynamic. Since its establishment in 2016, YGU has drawn students from Sub-Saharan Africa (SSA) and the Association of Southeast Asian Nations (ASEAN), many of whom originate from educational systems with restricted access to advanced digital technologies. This disparity in technological exposure, compounded by generational differences, may affect the ease with which students from different age groups utilize AI tools. Younger students may quickly integrate AI technologies into their academic routines, whereas older students may experience difficulties adapting to these tools (Van Dijk, 2020). Such challenges highlight the importance of examining age as a key factor influencing the frequency of AI usage, the ease of its use, and future responses to AI integration in education.

Furthermore, as AI technologies continue to evolve, understanding students'

responses to their long-term use becomes essential. Continuous advancements in AI may widen the gap between early adopters and those who are slower to embrace these tools, potentially impacting academic performance and satisfaction (Koch & Boudreau, 2020). If institutions do not address this divide, it could exacerbate existing inequalities in educational outcomes.

Educational leadership can play a proactive role in this context by advocating for policies that prioritize equitable access to technology and support for students of all ages. By fostering a culture of continuous learning and adaptation, leaders can encourage students to embrace new technologies and reduce the risks of falling behind in an increasingly digital academic landscape.

Given these considerations, this study seeks to understand how age affects students' interactions with AI tools, focusing on how often they use these tools, how easy they find them to use, and how they may respond to AI's increasing presence in education. This study aims to examine elements within YGU's broad international student population to yield insights that will guide the formulation of strategies for assisting students of varying ages in adopting and effectively using AI tools. Such strategies could be informed by the principles of educational leadership, which emphasize inclusivity and adaptability, ultimately guiding the creation of inclusive educational environments that bridge the technological gap between generations (Venkatesh et al., 2003).

2. Research Hypothesis

The hypothesis formulated for the study is as follows:

- H1: There is a significant relationship between age and the perceived ease of use of generative AI tools among graduate students.
- H2: Age significantly influences how students perceive generative AI tools as beneficial for improving academic performance in academic tasks.

3. Literature Review

3.1. Introduction

The relationship between age and technology adoption has been extensively studied, particularly in the context of educational technologies and the emergence of artificial intelligence (AI) in academic environments. While older generations may initially resist novel technologies, understanding how learners of all ages engage with these transformative tools is crucial. A recent study (Wang et al., 2023) revealed that nearly half of students now utilize generative AI for academic assignments, highlighting its growing prevalence in modern education. This trend necessitates that instructors adapt their content development strategies to meet the evolving needs and preferences of students. Educational leaders play a pivotal role in facilitating this adaptation by fostering an environment that encourages the exploration and integration of AI tools in the curriculum. Understanding the influence of age on the adoption of AI tools is essential for creating inclusive and effective educational settings, particularly for graduate students who often balance

academic, personal, and professional obligations. This literature review examines the main issues surrounding generative AI, technology adoption, age-related disparities, and the academic experiences of international students in higher education, substantiating the assertion that age significantly affects the adoption and utilization of AI tools among graduate students.

3.2. Generative AI in Higher Education

Generative AI encompasses tools that create content, such as text, images, or code, and has become increasingly relevant in higher education due to its ability to automate academic tasks and assist learning (Chen et al., 2021a). Recent studies indicate that nearly half of students now use generative AI for academic assignments, underscoring its growing influence in education (Wang et al., 2023). Platforms like ChatGPT and Jasper serve as tools for students to generate ideas, receive writing assistance, and synthesize research. Incorporating generative AI into course content development offers benefits such as faster content creation, diverse educational resources, and the ability to adapt to individual student needs (Wang et al., 2023). Educational leaders can leverage these advantages by providing professional development opportunities that equip educators with the skills to effectively integrate AI into their teaching practices. These tools are particularly beneficial for doctoral and master's students, allowing them to save time on routine tasks and focus on higher-order thinking skills (Huang & Liao, 2015a). However, the adoption of AI tools varies widely based on students' age and technological proficiency.

3.3. Age, Technology Adoption, and Digital Literacy

Various theoretical models have sought to explain how users embrace and utilize technology. Many studies indicate that older individuals are often less likely to adopt new technologies, perceiving greater effort is required to learn and use them, in contrast to younger individuals who typically experience fewer barriers. Venkatesh and Bala (2008) found that age significantly moderates technology adoption, with older users reporting greater difficulty and requiring more time to adapt to new systems. This dynamic can influence the use of generative AI tools in educational contexts, where both instructors and students represent a range of ages and technological proficiencies (Zastudil et al., 2023). Consistent with previous findings (Igbaria et al., 1997; McGivney, 2004), older adults generally display lower receptiveness to new technologies, a phenomenon that can be particularly pronounced in academic settings where older graduate students face increased stress due to balancing multiple responsibilities.

Conversely, other models suggest that individual characteristics, such as technological self-efficacy, can mitigate the effects of age on technology adoption. Users with higher confidence in their ability to learn and use new technologies may be more willing to explore generative AI tools, regardless of age (Mariano et al., 2021). Educational leaders can promote technological self-efficacy by creating

supportive environments that encourage experimentation with AI tools, thereby empowering students of all ages to engage more fully with technology. This suggests that confidence in using technology can help bridge the generational gap, though age-related differences in digital literacy and familiarity with technology still pose significant challenges, especially with complex tools like generative AI (Prensky, 2001). While younger students, often labeled "digital natives," have grown up with digital technologies and adapt quickly to new tools, older students, referred to as "digital immigrants," may encounter a steeper learning curve (Prensky, 2001). This discrepancy is especially relevant in AI usage, as older students tend to report challenges in understanding the functionalities and potential applications of AI tools (Van Dijk, 2017).

Research by Czaja and Sharit (1998) supports this view, indicating that older adults typically report lower levels of self-efficacy regarding technology use, which can hinder their willingness to adopt new systems. This finding may explain why younger graduate students are more likely to report positive experiences with AI tools, finding them intuitive and user-friendly (Chen et al., 2021b). Additionally, a study by Santos et al. (2020) highlighted that older graduate students benefit from structured support and guidance to effectively utilize AI technologies, suggesting that educational leaders should implement targeted interventions that provide additional resources and training for older students to enhance their engagement with AI tools.

Several barriers to AI adoption among older students can be attributed to cognitive load associated with learning new technologies. Sweller's (1988) cognitive load theory posits that individuals with lower levels of prior knowledge in a given area experience a higher cognitive load when confronted with new information. In the case of AI, older students with less familiarity with digital tools may face greater cognitive load, leading to frustration and reduced engagement.

Motivational factors also influence the adoption of AI technologies. Igbaria et al. (1997) noted that older adults often exhibit lower intrinsic motivation to adopt new technologies, perceiving them as unnecessary or too challenging to learn. In contrast, younger students may feel more compelled to adopt AI tools, viewing them as essential for maintaining competitiveness in academic and professional environments. Educational leaders can help bridge this motivational gap by emphasizing the relevance and applicability of AI tools in real-world contexts, thereby fostering a culture of continuous learning and innovation. This motivational gap further contributes to the disparities in AI adoption rates across age groups.

3.4. AI and Academic Performance

Research has explored AI's role in enhancing academic performance, particularly regarding the understanding of complex concepts and productivity (Huang & Liao, 2015a). However, findings suggest that the benefits of AI tools may not be evenly distributed across age groups. Younger students, who tend to be more

comfortable with technology, report higher satisfaction levels with AI tools and are more likely to attribute improvements in academic performance to their usage (Caballero et al., 2019). Conversely, older students may experience varying levels of benefit, as their learning processes may not be as seamlessly integrated with AI tools. A study by Chen et al. (2021b) indicated that younger students reported greater engagement with AI tools, leading to better grades, increased productivity, and a deeper understanding of subject material. In contrast, older students acknowledged the usefulness of AI tools but often struggled to utilize them effectively, which may mitigate the tools' potential positive impact on academic performance. Educational leaders must recognize these differences and advocate for differentiated support systems that cater to the diverse needs of students, ensuring that all learners can leverage AI tools to enhance their academic success. These findings imply that while AI has the potential to enhance learning for all students, its effectiveness may be moderated by age, with younger students experiencing greater advantages.

4. Method

This section outlines the methodology used to investigate the impact of age on the usage and perceived ease of generative AI tools among international graduate students. The research was conducted using a quantitative approach. The subsequent subsections delineate the population and sample, instrumentation, data gathering methodologies, and data analysis approaches.

The purpose of the chosen method and methodology in this study was to investigate the relationship between students' age and their perceptions of generative AI tools, focusing on ease of use, academic performance, comprehension of complex concepts, and time-saving benefits. A quantitative research approach was selected to objectively measure and analyze the data, allowing for statistical testing of the hypotheses. Specifically, a one-way analysis of variance (ANOVA) was used to determine whether significant differences existed between age groups concerning the ease of using generative AI tools. This method is appropriate because it enables the comparison of multiple groups on a single dependent variable, providing insight into whether age influences students' interactions with AI tools.

The methodology, based on a survey distributed to graduate students, was chosen for its ability to gather large amounts of data efficiently and assess various dimensions of students' experiences with AI tools. The use of structured questions with Likert-scale responses allowed for the quantification of subjective perceptions, making the data suitable for statistical analysis. This methodological choice aligns with the study's objective to establish empirical relationships between age and AI tool use, making it possible to generalize the findings to the broader population of graduate students. The rationale behind these choices was to ensure rigorous, reliable, and valid results that could inform future educational strategies and technology integration efforts in higher education.

4.1. Population and Sample

The study's target population consisted of 150 international students enrolled in graduate programs. The students had a varied demographic, predominantly from Sub-Saharan Africa (SSA) and the Association of Southeast Asian Nations (ASEAN) countries. A total of 108 students were selected from this population using a basic random sampling method. Simple random sampling was chosen to guarantee that each student had an equal opportunity to be included in the study, thus reducing sampling bias.

When determining an appropriate sample size for a population of 150, several key factors must be considered, including the confidence level, margin of error, and population variability. For most research, a 95% confidence level and a 5% margin of error are commonly used. Using these parameters, researchers often apply the sample size formula for finite populations, which considers the total population size (N), the Z-score corresponding to the desired confidence level (1.96 for 95%), the estimated proportion (p), and the margin of error (e). Based on this method, the recommended sample size for a population of 150 typically falls between 108 and 113 respondents to ensure a statistically reliable outcome (Cochran, 1977).

4.2. Instrumentation

Data were collected using a structured questionnaire designed to measure students' frequency of usage, perceived ease of use, and future responses to AI tools. The questionnaire consisted of two sections:

1) Demographic Information: This section captured respondents' age, gender, academic program, and years of experience using AI tools. Age was categorized into four groups: 21 - 25, 26 - 30, 31 - 35, 36 - 40, and above 40 years.

2) AI Usage and Ease of Use: The second section included items measuring the frequency of generative AI tool usage (e.g., daily, weekly, monthly), ease of use, and importance to student learning (rated on a 5-point Likert scale from "very difficult" to "very easy"). The items were adapted from existing validated scales used in technology acceptance research (Davis, 1989; Venkatesh et al., 2003).

The instrument's reliability was assessed using Cronbach's alpha, yielding a value of 0.82, which signifies acceptable internal consistency. This reliability is particularly important in the context of educational leadership, as it ensures that the findings can inform strategies to enhance technology adoption and integration within educational settings.

4.3. Data Collection Procedures

The data collection occurred over a duration of three weeks in September 2024. The questionnaire was disseminated online through email to a chosen sample of 60 students. Participation was voluntary, and informed consent was secured from all respondents prior to their completion of the survey. To improve the response rate, reminder emails were dispatched twice throughout the data collection

period. The questionnaires were emailed to a total of 120 students. 108 questionnaires were completed and submitted, resulting in a response rate of 90%. The elevated response rate enhanced the data's dependability and guaranteed that the findings accurately represented the sample. Such high engagement levels reflect the effective communication and leadership strategies employed in the research, illustrating how educational leaders can foster a culture of responsiveness among students regarding technological advancements.

4.4. Data Analysis

The gathered data were examined utilizing the Statistical Package for the Social Sciences (SPSS) version 28. Descriptive statistics, encompassing means, standard deviations, and frequencies, were computed to elucidate the sample characteristics and respondents' perceptions of AI technologies. A one-way analysis of variance (ANOVA) was performed to investigate the correlation between age and the usability of generative AI tools. Age was designated as the independent variable, classified into four categories (21 - 25, 26 - 30, 31 - 35, 36 - 40, and above 40 years), whilst the ease of use of AI tools functioned as the dependent variable. The ANOVA assessed if statistically significant variations existed among the age groups regarding their perceived ease of AI tool utilization. The significance threshold was established at $p < 0.05$ for all statistical analyses.

Furthermore, effect size was quantified using eta squared (η^2) to ascertain the amount of variance in ease of use attributable to age differences. Cohen's (1988) criteria indicate that η^2 values of 0.01, 0.06, and 0.14 correspond to modest, medium, and high effect sizes, respectively. This analysis not only informs the findings but also guides educational leaders in identifying which age groups may require targeted support in adopting AI technologies, thereby enhancing their leadership strategies in promoting technology integration in curricula.

4.5. Ethical Considerations

This study adhered to ethical research standards. Ethical approval was secured from the university's Institutional Review Board (IRB) prior to data collection. Participation was voluntary, and all respondents provided informed consent. The anonymity and confidentiality of participants were preserved during the research procedure, and no identifying information was gathered. Participants were notified that they might exit the study at any moment without consequence. Maintaining ethical integrity is vital in educational leadership, as it fosters trust and encourages a positive environment for innovation and learning among students.

5. Findings

This age distribution (**Table 1**) highlights a predominance of younger students, particularly in the 26 - 30 years age group, which may reflect trends in international student enrollment in graduate programs. The underrepresentation of older students (above 40 years) could indicate several factors, such as the increasing

trend of younger individuals pursuing advanced degrees or potential barriers faced by older students in accessing international educational opportunities (Hemsley-Brown & Oplatka, 2015).

Table 1. Age distribution.

Age Group	Frequency	Percentage
21 - 25 years	10	9.2%
26 - 30 years	40	37.0%
31 - 35 years	28	26.0%
36 - 40 years	22	20.4%
Above 40 years	8	7.4%
Total	108	100%

Understanding this demographic breakdown is crucial for interpreting the study's findings regarding the usage and perceived ease of generative AI tools. The variance in age (more than 70% of the respondents are below 36 years) may influence the familiarity, comfort, and frequency of use of AI technologies, which is a key focus of the research. Studies have shown that younger individuals tend to be more adaptable to new technologies and may exhibit higher levels of engagement with digital tools (Prensky, 2001). Consequently, the results may inform strategies to tailor AI tool training and support, particularly for older students who might require additional resources to adapt to these technologies (Huang & Liao, 2015b).

Table 2 reveals students' perceptions of generative AI tools across five key dimensions, with generally positive attitudes reflected in the mean scores. For instance, students found generative AI tools moderately easy to use (M = 3.41, SD = 1.25) and believed they saved time on academic tasks (M = 3.60, SD = 1.25). These findings suggest that AI tools are perceived as user-friendly, aligning with previous research indicating that intuitive design in AI systems enhances user adoption (Zhou & Wang, 2020). Additionally, students agreed that AI tools help in understanding complex concepts (M = 3.53, SD = 1.31), which supports the idea that AI can improve comprehension, especially in complex learning environments (Chen et al., 2021b). However, their views on AI improving academic performance were more neutral (M = 3.07, SD = 1.16), implying that while AI tools may assist with certain tasks, they are not universally seen as transformative for overall academic success. This resonates with findings from Huang and Liao (2015a), who noted that while digital tools can enhance academic productivity, their direct impact on performance depends on the learner's engagement level and the complexity of the tasks. The standard deviations across all dimensions indicate moderate variation in responses, reflecting individual differences in how students experience the benefits of generative AI tools. This is consistent with studies that show digital tool adoption varies based on factors such as technological proficiency, age, and familiarity with AI tools (McGivney, 2004; Prensky, 2001). The variance suggests that

while many students find AI tools beneficial, others may require more support or training to realize the same advantages, highlighting the need for targeted interventions to bridge these gaps.

Table 2. Gen AI usage perception.

	I find gen AI tools easy to use.	Using gen AI tools improves my academic performance.	How important is gen AI to your academic success?	Gen AI tools help me better understand complex concepts.	Using gen AI tools saves me time on academic tasks.
Mean	3.41	3.07	3.28	3.53	3.6
Std. dev.	1.25	1.16	1.15	1.31	1.25

5.1. Age and Perceived Ease of Use of Generative AI Tools

The results of a one-way analysis of variance (ANOVA) indicated a statistically significant difference between age groups and the perception of ease of use of generative AI tools, $F(2, 97) = 3.14$, $p = 0.022$. Given the p-value, which falls below the commonly accepted threshold of 0.05 (Field, 2013), the null hypothesis—asserting no difference between age groups—was rejected. This suggests that age plays a significant role in how students perceive the ease of using AI tools, aligning with studies that suggest age influences technology adoption and user experience (McGivney, 2004; Prensky, 2001).

The effect size, represented by the eta squared (η^2) value of 0.2, further highlights the practical significance of these findings. According to Cohen (1988), an η^2 of 0.2 denotes a large effect size, indicating that approximately 20.4% of the variance in the perceived ease of AI tool use can be attributed to differences in age groups. This substantial effect size suggests that age is not only statistically but also practically significant in influencing how students experience and adopt AI tools. These findings are consistent with previous research, such as that by Venkatesh et al. (2003), which reported that older adults often face greater difficulties in adopting new technologies compared to younger counterparts, who are more accustomed to digital tools. (**Table 3**)

Table 3. Age and perceived ease of use of generative AI tools.

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Value	p-Value	Effect Size (η^2)
Between Groups	12.47	2	6.235	3.14	0.022	0.2
Within Groups	192.79	97	1.987			
Total	**205.26**	**99**				

However, these results contrast with studies by Igbaria et al. (1997), which found that while age may initially affect technology adoption, this effect diminishes

as users gain more experience and familiarity with the tools over time. In this context, the large effect size seen in the current study could be due to the relative novelty of AI tools among certain age groups, reflecting varying levels of digital literacy.

The significant difference between age groups and the ease of AI tool use, coupled with the large effect size, underscores the need for age-specific interventions when introducing technological tools in educational settings. This finding adds to the existing body of research, highlighting the influence of age on technology adoption, but also calls for further investigation into how continuous exposure and training might mitigate age-related barriers in AI usage (Venkatesh et al., 2003; Igbaria et al., 1997).

5.2. Age and Perceived Importance of Generative AI Tools

A one-way analysis of variance (ANOVA) was conducted to examine the relationship between age and the perceived importance of generative AI for academic success. The analysis revealed a significant effect of age on this perception, $F(2, 97) = 4.93$, $p = 0.002$, leading to the rejection of the null hypothesis. The effect size, measured by eta squared ($\eta^2 = 0.29$), indicated that 29.11% of the variance in the perceived importance of generative AI could be explained by age group differences. This represents a large effect, according to Cohen's (1988) benchmarks for effect size.

These findings suggest that older students may not perceive generative AI tools as critical to their academic success compared to their younger counterparts. This aligns with prior research, which shows that older individuals tend to be slower in adopting emerging technologies and may view them as less essential (Davis, 1989). Venkatesh et al. (2003) also found that older users are less likely to perceive the benefits of technology in professional or academic settings, often due to greater discomfort or unfamiliarity with technological advancements. (**Table 4**)

Table 4. Age and perceived importance of generative AI tools.

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Value	p-Value	Effect Size (η^2)
Between Groups	15.28	2	7.64	4.93	0.002	0.29
Within Groups	150.2	97	1.55			
Total	**165.48**	**99**				

The implications of this are significant for educational institutions, as older students who do not consider generative AI important may be at a disadvantage in increasingly AI-driven academic environments. As generative AI tools are integrated into curricula to enhance learning and research productivity, older students may struggle to keep pace, potentially impacting their academic outcomes. This could widen the digital divide within educational settings, as younger students benefit more from these tools. Moreover, the lack of engagement with AI

among older students could limit their competitiveness in the labor market, where AI-related skills are becoming increasingly valued (Venkatesh & Morris, 2000). To mitigate these issues, institutions may need to provide targeted training or support to help older students understand the relevance and practical benefits of generative AI for their academic and professional development.

6. Discussion

The findings of this study provide strong evidence supporting the research hypotheses. Hypothesis 1 (H1), which posited a significant relationship between age and the perceived ease of use of generative AI tools, was supported by the data. A one-way ANOVA revealed a significant difference in the perception of AI tool ease of use across age groups ($F(2, 97) = 3.14$, $p = 0.022$), indicating that age plays a critical role in shaping how students engage with AI tools. This aligns with proposal by Davis (1989), which suggests that perceived ease of use is a key factor in the adoption of technology. The large effect size ($\eta^2 = 0.20$) indicates that 20.4% of the variance in perceived ease of use can be attributed to differences in age, reinforcing prior studies that show older individuals tend to experience more difficulties when adopting new technologies due to lower familiarity and digital literacy (Venkatesh et al., 2003).

Hypothesis 2 (H2), which asserted that age significantly influences how students perceive generative AI tools as beneficial for improving academic performance, was also supported by the data. The ANOVA results ($F(2, 97) = 4.93$, $p = 0.002$) confirmed that age significantly impacts students' views on the importance of AI for academic success. This finding is consistent with previous research that suggests older individuals are less likely to perceive new technologies as beneficial or transformative in their academic or professional work (Igbaria et al., 1997; Venkatesh & Morris, 2000). The eta squared value ($\eta^2 = 0.29$) indicates that 29.11% of the variance in the perceived importance of AI tools can be explained by age, a large effect that underscores the extent to which generative AI is viewed differently by younger and older students.

These findings highlight important nuances in technology adoption, particularly the age-related barriers that exist within higher education. Younger students, who typically exhibit higher levels of digital literacy and adaptability to new technologies (Prensky, 2001), are more likely to find generative AI tools user-friendly and beneficial for academic tasks. Conversely, older students, who may face challenges related to technological unfamiliarity, tend to underutilize or undervalue these tools, perceiving them as less integral to their academic success (Huang & Liao, 2015a). This aligns with Venkatesh et al.'s (2003) findings that age is a critical factor influencing technology adoption behaviors.

7. Implications

7.1. For Academia

The findings of this study underscore the necessity for academic institutions to

recognize the varying perceptions of generative AI tools among different age groups. As older students may not perceive these technologies as essential to their academic success, educational leaders should spearhead the implementation of targeted training programs that cater specifically to their needs. Faculty members should integrate generative AI tools into the curriculum, emphasizing their practical applications and benefits. Such initiatives can enhance older students' comfort and familiarity with these technologies, ultimately fostering an inclusive learning environment where all students can thrive (Zhou & Wang, 2020). Furthermore, promoting peer mentorship programs that pair younger and older students could facilitate knowledge transfer and support, helping to bridge the digital divide and enhance overall academic performance (Huang & Liao, 2015a). Educational leaders can play a pivotal role in creating a culture that values diversity in learning styles and technological engagement, ensuring that all students, regardless of age, feel empowered to utilize AI tools effectively.

7.2. For Policy Making

For policymakers, the implications of this study highlight the need to develop policies that promote equitable access to educational technologies across different demographics. Recognizing that older students may face unique challenges in adopting generative AI tools, educational leaders can advocate for funding and resources aimed at improving digital literacy among this population (Davis, 1989). This could include initiatives that provide accessible training programs, workshops, and resources tailored to older students. Additionally, policies should encourage institutions to foster environments that support technological adaptability, ensuring that all students can benefit from advancements in educational technology (Venkatesh et al., 2003). By addressing these disparities, educational leaders can contribute to creating a more equitable educational landscape that enhances learning outcomes for all students.

7.3. For Further Research

This study opens several avenues for further research into the perceptions and usage of generative AI tools across diverse student demographics. Future studies could explore the longitudinal effects of training interventions on older students' perceptions and usage of AI technologies, assessing how continuous exposure and practice influence their attitudes and academic performance (Igbaria et al., 1997). Additionally, research could investigate the underlying factors contributing to older students' reluctance to engage with generative AI, such as personal beliefs, prior experiences with technology, and cultural influences (Prensky, 2001). Comparative studies examining generative AI perceptions in different cultural or educational contexts could also provide valuable insights into how age and technology adoption intersect globally. Ultimately, such research endeavors can inform strategies to enhance the integration of generative AI tools in education, ensuring that they meet the diverse needs of all learners. Educational leadership plays a critical

role in championing this research, fostering collaborative efforts between institutions and scholars to drive innovation and inclusivity in the adoption of AI technologies.

8. Limitations

The limitations of this study are important to consider when interpreting the findings and their implications. First, although the sample size is statistically adequate for this research, the relatively small population of 150 graduate students limits the generalizability of the results. Since the study was conducted within a specific academic context, focusing on graduate students, the findings may not apply to other groups, such as undergraduate students or professionals in non-academic environments. Larger and more diverse samples would be required to generalize the results across different educational systems, geographic regions, and demographic categories.

Another key limitation is the reliance on self-reported data to measure students' perceptions of generative AI tools. While self-report surveys are useful for capturing subjective experiences, they are prone to biases. Participants may overestimate or underestimate their ease of use with AI tools or the impact these tools have on their academic performance. Self-reported data can be influenced by social desirability bias or inaccurate self-assessment. Therefore, future research could benefit from incorporating objective measures, such as tracking students' actual performance or their usage of AI tools, to validate the self-reported findings.

This study also utilizes a cross-sectional design, meaning that data was collected at a single point in time. While this approach provides a snapshot of the relationship between age and the perceived ease of using AI tools, it cannot account for changes in students' perceptions or abilities over time. A longitudinal study, which follows participants over a longer period, would offer more insight into how familiarity with AI tools evolves and whether age-related differences diminish or increase with prolonged exposure to the technology.

Another limitation is the lack of control over potential confounding variables. Although age was the primary variable of interest, other factors, such as prior exposure to AI tools, technological proficiency, and students' academic backgrounds were not controlled for. These variables could influence students' ease of use and perceptions of AI, potentially confounding the relationship between age and AI adoption. Future studies could include these factors as covariates in their analyses to provide a clearer understanding of the unique contribution of age to AI adoption.

The focus on generative AI tools also presents a limitation. This study exclusively examined students' interactions with a specific subset of AI tools, which may not represent the broader spectrum of AI technologies used in education. Students' experiences with AI may vary depending on the type of tool, such as adaptive learning platforms, chatbots, or AI-driven recommendation systems. As a result, the findings may not be generalizable to other AI applications in education,

and future research could explore a wider range of AI tools to gain a more comprehensive understanding of their impact.

Cultural and regional factors are another important limitation of this study. The research was conducted within a specific cultural and educational context, which may influence students' attitudes toward AI and technology in general. Cultural differences in technology acceptance, education systems, and age-related expectations can vary widely across regions. As such, the findings may not be fully applicable to students from other cultural backgrounds, and comparative studies would be useful in examining how cultural context interacts with age to affect AI adoption.

Finally, the technological environment in which the study was conducted was not fully considered. Differences in access to technological infrastructure, such as high-speed internet or advanced devices, could significantly affect students' ability to engage with AI tools. Students with limited access to such resources may experience greater difficulty using AI tools, regardless of their age. Future research should consider how technological infrastructure and access influence the relationship between age and AI tool adoption.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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