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Awareness, benefits, threats, attitudes, and satisfaction with AI tools among Asian and African higher education staff and students

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Abstract

Artificial intelligence (AI) tools are now used in our daily lives. This study aimed to explore the level of awareness, perceived benefits, threats, attitudes, and level of satisfaction with AI tools among individuals within higher education in Asia and Africa. A cross-sectional study was conducted in August 2023. Snowball sampling was used with a convenience sample of 815 highly educated Asian and African participants from 11 countries. About 56% of participants have Bachelor's degrees. 312 participants (38%) were unaware of Al tools and Al tools were used rarely by 316 (63%) of 503 participants who were aware of them. ChatGPT is the most popular of this study's Al tools (N=405, 81%). Participants who used Al tools reported greater benefits than those who did not (p < 0.05). ¬Of the four educational groups, those with a Master's degree reported a higher AI tool threat than those with a Diploma (P < 0.05). Female participants reported more Al-related threats than males (P < 0.05). In conclusion, this research is important because of the rapid development of modern technology around the world. Nevertheless, Asia and Africa still lag behind developed nations in AI technology awareness.

Introduction

Artificial intelligence (Al) is the technology that enables a computer system or computer-controlled robot to learn, reason, observe, infer, communicate, and make judgments similarly to or better than humans (Crompton & Burke, 2023; Ismail et al., 2023; Robert, 2019). It is one of the most revolutionary technologies of the twenty-first century, with profound effects on the economy and society (Scherer et al., 2023). In recent years, Al has made tremendous advancements, generating a vast array of tools and applications. Al is now an indispensable element of modern civilization. These tools can facilitate decision-making, enhance information transmission, and close knowledge gaps (Rajagopal et al., 2022).

The significance of using AI tools is immense and growing. AI systems improve decision-making by analyzing vast volumes of data to identify patterns and trends that are difficult or impossible for humans to recognize (Aitkazinov, 2023; Bani et al., 2023). These data can be used to improve decisions in various areas, including product development, health care, and customer service. AI technologies that can be tailored to provide each client with the information and services they demand can be used to provide an exceptional customer experience (Adarkwah et al., 2023; Bharadiya, 2023), which could increase client satisfaction (Hu et al., 2023).

Tools for AI are now used in our daily lives (García-Peñalvo, 2023). Education and research based on AI have entered a new, rapidly increasing era. The improvement of research and educational precision and efficiency is one of the primary benefits (Ali et al., 2023; Basilotta-Gómez-Pablos et al., 2022). AI systems can quickly scan large data sets and identify links that are difficult for humans to recognize. This may result in more productive research, allowing scientists to focus on novel and demanding endeavors (Chan & Hu, 2023). For educational reasons, AI systems may assess the learning preferences and aptitudes of students and provide individualized guidance and support to help them achieve their goals (Dergaa et al., 2023).

The evolution of AI has had a major effect on contemporary culture and daily life (Hassoulas et al., 2023). Artificial intelligence has become indispensable, with predictive algorithms improving user experiences and virtual assistants easing activities (Rudolph et al., 2023). It revolutionizes businesses by providing power to recommendation systems, driverless vehicles, and healthcare diagnostics (Chen et al., 2020). However, cautious implementation is required due to ethical considerations, challenges related to data protection, and bias (Bohr & Memarzadeh, 2020). The undeniable impact of AI's ongoing development on our work, communication, and navigation is accompanied by a range of responsibilities and prospects associated with its pervasive integration (Thakur, 2024).

In higher education, AI is revolutionizing the learning environment. By adapting instructional information to the specific requirements of each user, adaptive learning platforms enrich personalized learning experiences (Thakur, 2024). Assessments are streamlined by automated grading systems, which also deliver quick feedback (Hassoulas et al.,

2023). The identification of at-risk students is facilitated by predictive analytics, which permits proactive interventions. Notwithstanding these progressions, ethical deliberations and the imperative for conscientious AI deployment continue to be pivotal in guaranteeing fair and impartial access and upholding the integrity of schooling (Wong et al., 2024).

Furthermore, AI in health studies has grown dramatically in the past decade (Abdullah & Sofyan, 2023). AI can boost healthcare efficiency and affordability. Large IT companies have invested billions in AI research because healthcare uses AI. Technology may replace human interaction and violate care ethics, among other disadvantages (Couture et al., 2023). Technology increases control needs. Healthcare AI has received little legal and ethical scrutiny (Bærøe & Gundersen, 2023).

There may be a limited number of research located in Africa or Asia that are comparable to ours. The benefits, threats, and attitudes of academics regarding Al tools were evaluated using a novel instrument that was constructed based on an extensive literature review. Understanding how faculty members and students use Al tools is essential since their viewpoints and behaviors can have a significant impact on the success of these technologies in their professions. By inquiring about their awareness of Al ideas and comprehension of its potential applications, we may estimate the depth of their expertise in this topic. Thus, this study aims to answer the following questions:

- What is the level of awareness of Al tools among individuals within higher education in Asia and Africa?
- Are there differences in the perceived benefits, threats, attitudes, and level of satisfaction with Al tools based on participant characteristics (age, gender, level of education, frequency of use, and country)?

Methods

Design

A cross-sectional study was conducted with Asian and African participants, with the majority from the Middle East, during the month of August 2023.

Sample and setting

Participants represented 11 nations, including nine Asian nations (Jordan, Palestine, Lebanon, Saudi Arabia, Iraq, Thailand, India, Philippines, and Kuwait) and two African nations (Egypt and Sudan). Google Forms were used to collect data from students and faculty at higher education institutions.

In this study, data were collected using a convenience sample because of its practicability and ease of access to participants (Polit & Beck, 2013). The developed online questionnaire link was sent to potential participants in all participating countries via WhatsApp, Facebook Messenger, and email

using the contact lists of the seven researchers of this study who are affiliated with higher education institutions. Each questionnaire link was sent with a message asking them to forward the study questionnaire to their colleagues and students who meet the eligibility requirements.

Eligibility requirements included being a resident of Asia or Africa, possessing a diploma or higher, and/or being a faculty member at a college or university. Because the research instrument was written in English, participants were also required to be able to read English.

Measures

The study measure consisted of three components. The sociodemographic and personal characteristics are covered in the first section. The second section was designed to measure attitudes, benefits, and threats toward Al tools in higher education. The third section was the satisfaction scale with Al tools in higher education.

The following sociodemographic characteristics were collected: age, gender, country, education, and employment type. Other information pertaining to Al tools was collected such as awareness of different types of Al tools (BardAl, ChatGPT, BingAl, Chatsonic, Writesonic, playground, Claude, Socratic, OpenAl, LaMDA2, Jasper2, and FalconLLM), and frequency of their use.

The psychometric instrument (Appendix 1) was developed by the research team to assess attitudes, benefits, and threats of AI tools among faculty members and students in higher education institutions (Ahmad et al., 2023). The research team reviewed the literature that discussed issues related to AI tools. Each one of the research team extracted main features and then assigned them under the theme of attitudes, benefits, and threats in a draft. The three suggested drafts were merged, and the duplicate items were removed. Then, the psychometric tests were conducted.

Visual Analogue Scale (VAS) was used to determine the level of participant satisfaction with AI tools. The participants were asked to rate their satisfaction with AI tools on a scale from 0 to 100 (Byrom et al., 2022). The higher the score, the more participant satisfaction with AI tools is implied.

Psychometrics of the attitudes, benefits, and threats instrument

The pre-final draft included 40 items, with seven items to assess the benefits of Al tools, 16 items to assess threats, and 17 items to assess attitude. The research teams agreed on the cleaned version of the instrument. Using the content validity index (CVI), the developed instrument's validity was evaluated. Three experts—one in information technology, one in nursing, and one in medical education—were consulted to determine the validity. The expert panel graded the applicability of each item on the tool. The average of the expert ratings is then used to calculate the CVI. Five of the study's items were removed because their CVI scores were less than .70 or irrelevant. Five experts—three from

the original panel and two new ones from the physics and sociology departments—evaluated the remaining 35 items. The minimum score for each item was .85, and the scale's overall CVI score was .95. Each item was measured using a 5-point Likert scale ranging from strongly disagree (0) to strongly agree (4).

Construct validity assessment on the study scale was performed through exploratory factor analysis (EFA). The 35 items were split up into three factors: 15 items were assigned to attitude, 14 to threat, and 6 to benefits. This analysis's overall explained variance was 55%.

For the three subscales as well as the overall scale, Cronbach's alpha was calculated. The benefits subscale score was 0.82, the threat subscale score was 0.91, and the attitude subscale score was 0.90. Additionally, the overall scale had a reliability score of 0.93.

Pilot study

A pilot study was conducted during the last week of July 2023, using Google Forms to evaluate the viability of the data collection methods and tools. Thirty faculty members and students were recruited for the piloting using an online survey. The survey comprised sociodemographic and personal data, assessments of attitudes, benefits, and threats regarding Al tools in higher education, as well as a satisfaction scale pertaining to such tools. Both the study scales and the sociodemographic questionnaire were distributed to participants. The principal investigator (PI) observed the participants and recorded any problems with the tools and procedures, such as misinterpretations of the questions or technical problems. The PI also requested participant feedback on the processes and instruments, such as questionnaire length and clarity of instructions.

The data from the pilot study were analyzed to make any necessary adjustments prior to the main study. The minor modifications based on the pilot study included clarification for the first page of the online questionnaire, which served as the consent form's cover sheet, had its font size clarified, the option to select 'other countries' was added, and the option to select the responding student's year of study was removed. The original draft contained 10 common types of Al tools, but pilot participants suggested adding two more, so the final version included twelve types. A final option was added to allow participants who were unfamiliar with the Al tools to submit their responses directly after they complete the sociodemographic questionnaire.

Ethical considerations

This study was conducted following the ethical guidelines set by the Helsinki declaration (Ashcroft, 2008). The Institutional Review Board (IRB) at the School of Nursing approved the study. The first page of the questionnaire includes the information of the research purpose, method, their rights not to participate and the confidentiality assurance. An email for members of the research team was provided to receive and answer expected participants' questions. The

informed consent was obtained through clicking "yes" for the question "Do you agree to participate in the current study?" The data were saved on the principal investigator's (PI) desktop, and only authorized research team members had access to the data.

Data analysis

IBM SPSS 29.01 was used for data analysis (IBM, 2023). Using tables and histograms, descriptive statistics were employed to summarize the demographic and participant characteristics. Analysis of Variance (ANOVA) was used as inferential statistical comparison between the benefits, threats, attitudes, and satisfaction with Al tools and the characteristics of the participants. A post-hoc test was performed on the significant ANOVA results to determine which groups have differences. An Independent sample t-test was used when gender was the independent variable.

Results

This study included 815 participants with a high level of education from 11 Asian and African countries. Approximately half of the participants (56%) hold a Bachelor's degree, while nearly 35% hold a Master's or Doctoral degree. This study has attracted more women than men (57.8%). The age range was from 18 to 69 years. The interesting findings concerned the frequency of AI tool usage and awareness with the 12 most common types of AI tools presented in this study. There were 312 participants (38%) who reported not being aware of any AI tools. In addition, 316 (63%) of the 503 participants who said they were aware of AI tools reported that they had used them rarely (Table 1).

Table 1: Descriptive statistics of the sample (N=815).

Variable	Aware of AI tools N=503		Not aware of any AI tools N=312		All sample N=815		
	n -505	%	n -512	%	n - 01	%	
Gender							
Male	246	48.9	98	31.4	344	42.2	
Female	257	51.1	214	68.6	471	57.8	
Age (Mean=30.98, SD=11.71)							
18-20 year	111	22.1	79	25.3	190	23.3	
21-30 year	162	32.2	99	31.7	261	32.0	
31-40 year	116	23.1	51	16.3	167	20.5	
41-69 year	114	22.7	83	26.6	197	24.2	
Education							
Diploma	37	7.4	26	8.3	63	7.7	
Bachelor	266	52.9	194	62.2	460	56.4	
Master	108	21.5	45	14.4	153	18.8	
PhD	92	18.3	47	15.1	139	17.1	
AI tool usage frequency							
Daily	37	7.4	-	-	38	4.7	
Weekly	88	17.5	-	-	90	11.0	
Monthly	59	11.7	_	-	59	7.2	
Rarely	316	62.8	-	-	316	38.8	
Never	-	-	-	-	312	38.3	
Country							
Egypt	30	6.0	17	5.4	47	5.8	
Sudan	17	3.4	24	7.7	41	5.0	
India	17	3.4	29	9.3	46	5.6	
Iraq	53	10.5	39	12.5	92	11.3	
Jordan	136	27.0	64	20.5	200	24.5	
Kuwait	63	12.5	23	7.4	86	10.6	
Lebanon	100	19.9	43	13.8	143	17.5	
Palestine	67	13.3	45	14.4	112	13.7	
Philippine	5	1.0	6	1.9	11	1.3	
Saudi Arabia	15	3.0	4	1.3	19	2.3	
Thailand	-	-	18	5.8	18	2.2	

The 12 different types of AI tools presented in this study's frequency distribution are shown in Figure 1. ChatGPT appears to be the most well-known and frequently used type (N=405); 81% of the 503 participants who indicated that they are aware of or have used AI tools. Open AI (this is not a type, but the company that owns ChatGPT) (N=173, 34%) was the second most popular mention of Al. About half of the participants (N=255, 51%) claimed to be aware of more than one type of AI tool. Despite being produced by the same company, OpenAI and ChatGPT serve distinct functions (Roumeliotis & Tselikas, 2023). OpenAl Playground is trainable, while ChatGPT is pre-trained and users cannot train it with their own data. While ChatGPT offers a simpler text-based interface for producing natural language responses to user queries, OpenAl Playground gives users a more interactive and visual way to experiment with Al models.

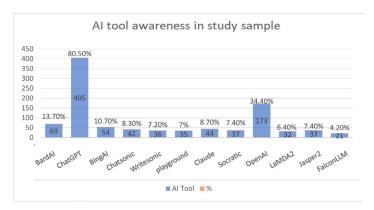


Figure 1: The frequency awareness for the 12 Al tools among the study participants. [What is the meaning of "OpenAl2"?] corrected as OpenAl.

The number of AI tools used, as reported by the 503 participants, is depicted in Figure 2. It is evident that 214 (43%) of the participants have used only one AI tool. Participants who reported using four or more types made up 58 (12%) of the total.

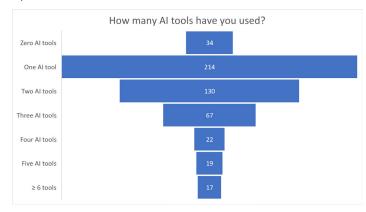


Figure 2: Number of AI tools the participants were aware of and or have used.

Table 2 presents the descriptive statistics for the four study scales. To facilitate interpretation, the original scores for the scales of attitudes, benefits, and threats were transformed to percentages. The final column of the Table shows the range for the four scales of the study between 59.69% and 68.71%. The top two items from each scale are included: for benefits,

Al tools save time and are used in education and research; for threats, Al tools require constant Internet access and reduce creativity and critical thinking; and for attitudes, Al tools may be used if edited and cited appropriately.

Table 2: Descriptive statistics for the study scales and the highest two items in each scale (N=503).

Scales	Mean	Standard deviation	Skewness	Min^	Max^	% Mean Scor
Benefit (6 items)	16.49	4.05	82	0	24	68.71
It saves time	2.97	.91				
AI tools are used in	2.80	.98				
education and research						
Threat (14 items)	36.52	16.9	68	0	56	65.24
It needs the Internet all the time	2.87	.99				
It decreases creativity and critical thinking	2.82	1.06				
Attitude (15 items)	38.35	8.87	93	0	60	63.92
I review and edit the response	2.76	.88				
that generated by AI tools before using						
them in my work						
Can be used if properly cited and	2.71	.87				
documented						
Satisfaction (VAS)*	-	-	-	0	100	59.69

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Those who are aware of one or more Al tools reported higher benefits than those who were unaware (p.<05). Among the four groups of educational attainment, we found that those with a Master's degree reported a higher Al tool threat than those with a Diploma (P<.05). Female participants reported more Al-related threats than males (P<.05). There were no significant differences based on education, age groups, gender, or country in terms of the benefits of Al tools. Threats posed by Al tools did not differ significantly by age group, country, or level of awareness. In addition, attitude and satisfaction with Al tools did not differ significantly across all the studied variables (Table 3).

In order to rule out type-II errors in ANOVA analysis and because some countries had small sample sizes, the Kruskal-Wallis test was used to compare the countries against the AI tools in the study. Consistent with the ANOVA analysis, the result indicated that there were no significant differences between the countries.

Discussion

In the past decade, research and development of Al-based technologies in healthcare, industry, business, and education have increased dramatically. There is a growing awareness of AI tools among faculty and students in higher education institutions around the world (Chan, 2023; Ifelebuegu, 2023). Al tools are becoming more popular for several reasons. Increasing tool availability is one factor. A growing media coverage of AI is another factor. The majority of participants in our study have only used one AI tool, ChatGPT being the most popular. Geographic location affects the degree of familiarity with AI tools. Of the total sample (815 participants), it is interesting to note that 38% of respondents claimed to be unaware of AI tools. Additionally, we found that of the 503 participants who are aware of AI tools, nearly 63% have rarely used it. Compared to the 72% of college students in the United States who are familiar with artificial intelligence (AI) and the 58% who believe AI will have a positive impact on their lives (Rodway & Schepman, 2023). This finding

Table 3: Comparison of the participant characteristics and the benefits, threats, attitudes, and satisfaction with AI tools (N=503).

Characteristics	Benefits of Al	Benefits of AI tools				
	Statistics test	P value	Scheffe post hoc			
Education level	F=0.69	.558				
Age (groups)	F=0.57	.636				
Gender	t=-0.26	.795				
AI tools awareness	F=2.71	.013	All who use AI tools ≥1, reported higher benefit than those who are not aware about it (p<.05)			
Country	F=0.61	.789				
	Threats of AI	tools				
Education level	F=3.92	.009	Master>Diploma (p<.05)			
Age (groups)	F=2.22	.085				
Gender	t=-2.04	.041	Females>Males (p<.05)			
AI tools awareness	F=1.51	.172				
Country	F=1.03	.416				
	Attitudes of A	I tools				
Education level	F=1.90	.129				
Age (groups)	F=1.71	.164				
Gender	t=0.30	.768				
AI tools awareness	F=0.69	.657				
Country	F=1.24	.270				
	Satisfaction	n with AI to	ools			
Education level	F=1.58	.193				
Age (groups)	F=2.35	.071				
Gender	t=1.71	.089				
AI tools awareness	F=1.39	.339				
Country	F=0.57	.820				

indicates a lack of awareness among our study sample.

According to our findings, 55% of those who used AI tools were under the age of 30, when most people are still enrolled in college as bachelor's or master's students. This could be justified by the fact that people of this age are used to using electronic devices, have grown up in a time where technology is an essential part of daily life, and use these devices for learning, for studying, and even for casual purposes. Many educational institutions have included platforms based on AI into their curricula, exposing students to AI ideas at a young age (Timotheou et al., 2023). Additionally, due to their cognitive flexibility and one of the most economical means of developing young brains, the younger generation is frequently more able to adapt to new technology (Kulkov, 2023).

There are conflicting findings in research regarding gender inequalities in information technology (Liang et al., 2023). In Asia and Africa, men have easier access to IT resources than women do (Kukulska-Hulme et al., 2023). This is consistent with our findings that women made up nearly 69% of participants who were unaware of any AI technologies.

Literature has focused on the possible roles in the medical field, notably in terms of education, research, and clinical settings (Periaysamy et al., 2023). Participants in the current study evaluated Al tools to be beneficial. However, the most troublesome aspect of deploying Al tools is not the level of recognizing Al tools' benefits; rather, the most challenging aspect is proving that Al tools are being used in daily attitude (Himeur et al., 2023).

Academic staff and students in higher education in Asia and Africa have different perspectives on the use of Al tools. Our research found that Al tools pose threats. The main two threats to Al tools were the need for constant Internet access and it also reduced creativity and critical thinking.

The literature, however, recognized many categories of threats. This finding is consistent with previous studies that reported numerous threats posed by AI tools (Algahtani et al., 2023; Ifelebuegu et al., 2023). In education, students may use AI to write the entire assignment rather than revising it; the data provided by ChatGPT require continuous updating (Periaysamy et al., 2023). Furthermore, Benvenuti et al. (2023) argue that Al tools cannot replace human interaction and that they may lead to a lack of critical thinking skills among students. Furthermore, in the current study, females more than males and those with a master's degree were more likely than those with a diploma degree to perceive Al technologies as threatening. No research has yet directly examined threats in education or by age or gender, but it might be presented as violence due to technology (Novitzky et al., 2023).

Despite the concerns, there are many benefits to using Al tools in higher education. Al can help reduce administrative tasks for teachers and staff, allowing them to focus on more important tasks (Chan, 2023). In our study, the top two benefits for Al tools were saving time and that it is used in education and research. Furthermore, our results support using Al tools if they are edited and cited appropriately. This finding has been emphasized in the recent literature in order to maintain ethics in using Al tools (Atenas et al., 2023; Kooli, 2023).

Implications

The study could help identify the specific benefits and threats of Al in higher education that are most relevant to students and faculty in Asia and Africa. This knowledge could be used to develop policies and practices that maximize the benefits of Al while minimizing its threats. The research could also assist in determining the level of student and faculty satisfaction with Al in higher education. Furthermore, the study could increase awareness of the potential of Al in higher education; promote the use of Al in higher education in a responsible and ethical manner; inform the development of policies for the use of Al in higher education; and contribute to the body of knowledge on the use of Al in education.

Conclusion

The application of artificial intelligence in higher education is still in its infancy, but it has the potential to revolutionize how we learn and teach. Asian and African countries included in this study still have lower levels of awareness of AI technology than Asian leaders, like South Korea and China. It is essential to be aware of the potential benefits and threats of AI and to implement safeguards to mitigate the threats. This research is more exhaustive because it includes a large number of participants from eleven Asian and African nations. Investigating 12 common types of AI tools provides valuable insight into the potential benefits, threats, attitudes, and satisfaction with AI tools in education and research. The application of AI in higher education is a difficult and complex issue. However, we must address this issue to ensure that our educational systems are future

ready. Concerns regarding ChatGPT differ based on gender and level of education, despite its increasing global usage. Given the rapid advancement of technology on a global scale, the findings underscore the importance of addressing the lack of awareness regarding artificial intelligence in the studied countries. A limitation of this study could be the non-proportional sampling, despite the fact that the sample size was relatively large and that there was a variety of settings. Moreover, the fact that African respondents originated from two different nations may also limit the generalizability of the findings.

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Appendix

Appendix 1: Attitudes, benefits, and threats associated with the use of Artificial Intelligence tools in higher education.

Please answer each of the following questions about what you know, how you feel, and what you do with Al tools. (Please note that there is no best answer; we just want to know your opinion about each item.)

	Attitudes (15 items)	Strongly disagree 0	Disagree 1	Neutral 2	Agree 3	Strongly agree 4
A1	AI tools content can be used if properly cited and documented					
A2	Authors should have proper knowledge on how to use AI tools					
A3	I recommend AI tools to a friend or colleague					
A4	I'm interested in using of a premium version of AI tools with advanced features					
A5	AI tools has a positive impact on my education/learning					
A6	There is a need for specific training on how to use AI tools in order for them to be useful.					
A7	I suggest providing adequate information on establishing ethical guidelines for the use of AI tools.					
A8	I think AI tools should be included in the study curricula					
A9	To improve AI applications in the real world, it is essential to encourage researchers to be honest and transparent about their methods.					
A10	I review and edit the response that generated by AI tools before using them in my work					
A11	AI tools can be listed as an author based on its significant contribution					
A12	I feel comfort with ethical and responsible use of AI-generated content from AI tools.					
A13	AI tools could enhance research (e.g., assisting the researchers in framing the sentences, improving the content drafted by the authors.					
A14	I think the responses generated by AI tools are overall easy and coherent					
A15	I trust the information that I read and see on AI tools?					
	Benefits (6 items)	Strongly disagree	Disagree	Neutral	Agree	Strongl agree
B1	Easy to use					
B2	Save time					
B3	Accessible with low cost					
B4	Help students to ask questions and interact with the material at their own pace					
B5	AI tools are user-friendly					
B6	I know that AI tools are used in education and research					
	Threats (14 items)	Strongly disagree	Disagree	Neutral	Agree	Strongl agree
T1	Lack of human interaction					
T2	Legal issue (eg. copyright issues, authorship)					
T3	Decrease creativity and critical thinking					
T4	AI tools does not replace practical training					
T5	Security concerns					
T6	Technical issue					
T7	Over-reliance on technology					
T8	Ethical dilemma/concerns such as plagiarism					
T9	Need Internet all the time					
T10	Difficulty in handling complex task in research					
T11	Inaccurate/incorrect or biased information	t				
T12	Over-detailed, redundant, excessive content					
T13	Using AI tools will reduce skills and abilities of person who use it (e.g., writing skills, critical thinking					
	etc)					

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