The social impact of artificial intelligence chatbots on college students

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Article Info

ABSTRACT

This study aims to investigate the impact of the freely accessible artificial intelligence chatbots (AICB) that might disrupt the teaching and learning pattern in higher education. While some education stakeholders developed strong opposition towards the AICB usage, condemning it as academic dishonesty, there are others believe the AICB might even improve the students' learning. A total of 160 urban college students were purposively selected and requested to respond to the scales of ChatGPT acceptance and trust, academic self-efficacy, and university mattering to test the hypothesis that the acceptance and trust towards AICB should improve academic self-efficacy and general mattering among the students. The results indicated that academic self-efficacy partially mediates the contribution of AICB on the societal mattering. In other words, the findings suggest that students who trust and accept AICB usage would likely to believe that they can perform academically better and therefore they feel they are more meaningful to the society. Limitations and suggestions for future research are discussed.

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1. INTRODUCTION

Interaction between human and technology had always been created a ripple in the human evolution process [1]. Just like the discovery of fire, wheels, calculators, or the internet, any technological advancement came with social impacts [2]. The technology of artificial intelligence (AI) might not be considered new in the time this paper is written, and since its invention in 1956 [3], but it has witnessed remarkable advancements in recent years, as it does not only alter the way the machines learn, it also improves the way machines learn 'understand' us [4]; the improved machine-human relationship has paved the way for the widespread adoption of AI across various sectors, including healthcare, finance, transportation [5], and entertainment [6].

One of the most captivating developments of AI is the emergence of publicly accessible AI chatbots. Conversational AI tools equipped to engage in natural language dialogue with human users, offering answers, translation, completing tasks, and even providing casual companionship [7]. Chatbots found their place in customer service, education, healthcare [8], and even creative art [9]. As AI technology continues to evolve, we can anticipate the emergence of increasingly sophisticated chatbots, further blurring the lines between humans and machines in our daily social interactions [10]. Moreover, many chatbots are available for free, and accessible to virtually everyone.

Its capability to store vast knowledge in many languages makes it easier for learners at any level to access and utilize it to solve problems, either academic, professional, or personal [10]. Numerous studies have been done on the interaction between human and AI chatbots in educational setting and mixed reactions were reported. For instance, there was a debate whether schools are allowed to utilize AI chatbots in their teaching and learning process [11] or whether chatbots are a disruptive towards the established educational system [12]; AI chatbots even attracted suspicions of academic dishonesty among their users [13]. On the other hand, many others view the availability of AI chatbots in education as a good precedence as it might fix what was lacking in the teaching and learning methods [14]. Some education stakeholders even believe that technological advantages like AI chatbots should be banned from the education system as they might disrupt the 'well-proven' teaching and learning system that has been running well for decades without the presence of any AI support [15]–[17].

The fear and concern of the older generation educators of AI chatbots technology reflects the fear of the need to adjust and insecurities [2]; it is rooted from the fear that their skillset is no longer adequate and they would be replaced by other individuals who can use the new technology better [18]. The reduced belief that they can perform well enough to survive would lead them to believe that they would be less significant to their immediate society [19], [20].

This fear can be explained by the critical race theory (CRT) [17]. Coined by Crenshaw in 1995 [21], CRT explained that certain members of the society, would feel marginalized and insecure about their social significance when they feel they do not have what it takes to survive in the societal competition. In the context of our studies, CRT explains that individuals who believe that their social roles can be replaced by the technology might develop fear or negative concern towards it and losing their self-efficacy. In turn, it will lead them to have lowered societal mattering, the sense that they matter to their immediate society [22]. Studies have reported that societal mattering is a protective factor against social anxiety, stress, or general mental health issues [23]–[25]. It was also suggested that unreadiness to accept changes, such as technology, led to the loss of self-efficacy due to perception that other individuals with better mastery of technology will replace them in the workplace and society. Acknowledging that, we conduct this study to investigate the impact of the AI chatbot technology on college students, who are mainly categorized as generation Z or Gen-Z (who are currently about 11 to 26 years of age).

Compared to the previous generations who are currently in the workforce, Gen-Z members were born digital natives and have developed higher new media literacy (NML), a skillset that allows individuals not only to consume the media content, but also produce and critically analyze it [26]. This skillset should might prepared them to accept and trust the newly acquired technology better than their predecessors; college students might perceive artificial intelligence chatbots (AICB) as supporting tools instead of threats [27].

A theory that might explain how Gen-Z might positively accept AICB technology is technology acceptance model (TAM), coined by Davis [28]. It suggested that the acceptance of a new technology is predicted by their perceived usefulness and perceived ease of use. As the Gen-Z individuals have higher NML and were born digital natives, they would see the AICB as more user-friendly and positively useful to enhance their learning by complementing the information they obtained from their educators [29], [30].

Fear of AI, as demonstrated by some members of the older generations [31] indicates the lower acceptance, which also suggested the perceptions that the technology is neither easy to use nor useful. Such attitude towards new technology [32], [33] can be explained by the generational gap between the Gen-Z, who were born digital natives, and Gen-X or early millennials who are not immediately exposed to technology such as web 2.0 (new media) or AI, and need more time to blend in. The aforementioned premises led us to hypothesize that as members of the younger generation, college students have higher acceptance and trust towards AI chatbot technology, and developed more positive attitude, that the technology would help them to achieve better, and increase their academic efficacy [34], [35], which then lead them to develop higher levels of societal mattering [36]. The hypothesis is conceptualized in Figure 1.

In the context of this study, AICB was represented by ChatGPT, an AI chatbot application produced by OpenAI. The free version, GPT 3.5 is a large language model that enables users to hold engaging conversations, gain insights, automate tasks, and experience the future of AI. The paid version, GPT 4 offers features like vision (chatting with images), Dalle 3 image generation, and voice interaction.
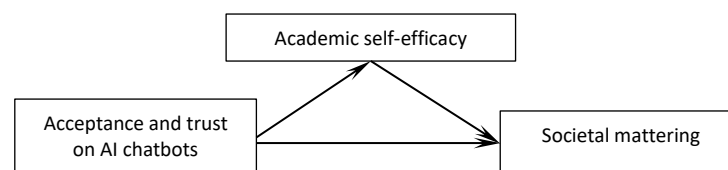

Figure 1. The conceptual framework

Contextually, the societal mattering was represented by college mattering [37], as college and university societies are considered the closest societies of the students, apart from their respective families. Accordingly, it was suggested that college students consider that being acknowledged and needed by their college community predict their wellbeing and happiness in general [25], [38]; thus, addressing how the students' societal mattering affected by their perspectives on AI chatbot technology is important as a part of developing an effective technology-based students wellbeing support system.

2. METHOD

2.1. Participants
A total of 160 college students have been purposively recruited with inclusion criteria of 18 to 32 years of age and registered as students in Malaysian universities. G*Power sample size calculator, set to the moderate power with 95% confidence, and suggested 150 as the minimum sample size. To maintain high ethics standard, informed consent forms were signed before they provide their data. The ethical review clearance was given by the Ethics Review Board (ERB) of the Faculty of Psychology and Social Sciences with serial number FPSS/2023(010). Participants were given the link that consists of informed consent form, demographic questionnaires, and a set of scales to gauge the studied variables. The participants participated on voluntary basis.

2.2. Measurement
The predictor variable, ChatGPT acceptance and was measured by using TAM-based ChatGPT Scale (TAME) [39], a 36-items scale with 0.98 internal consistency reliability with a sample item, "For me ChatGPT is a convenient method for accessing information." The outcome variable, societal mattering, was gauged by using the University Mattering Scale [37] was used to measure the societal mattering, it is a 15-items Likert scale with 0.95 Cronbach's alpha reliability on our participants; one of the sample items is "The people of my community pay attention to me." The mediator variable, self-efficacy was measured with Academic Self-Efficacy scale [40], a 7-items questionnaire, with one of the sample items is "How well can you make good use of your lecturer's suggestions to write your assignment?", and its Cronbach's alpha reliability on our participants was 0.95.

2.3. Data analysis
Data was analyzed by using Bootstrap analysis methods model 4 with 5,000 resampling at 95% confidence interval was conducted with PROCESS Macro. for SPSS 29. The method is considered robust, it provides several key advantages, such as it mitigates the impact of outliers and skewed distributions, rendering the analysis less susceptible to violations of normality assumptions [41]. When working on limited number and non-normally distributed samples, it is especially advantageous when the participants were recruited purposively [42]. The utilization of 5,000 resampling iterations in the bootstrap procedure enhances the stability and precision of parameter estimates, offering a comprehensive exploration of the sampling distribution of indirect effects. Thus, fortifying the statistical inferences drawn from the observed data in the context of mediation hypothesis [43].

3. RESULTS AND DISCUSSION

3.1. Results
The results of the PROCESS Macro model 4 was chosen to analyze the data as the model is the most appropriate tool to test the mediation hypothesis. It allows for the simultaneous estimation of both the direct effect of the independent variable on the dependent variable (path c) and the indirect effect of the independent variable on the dependent variable through the mediator (path c'), as well as the effect of the independent variable on the mediator itself (path a). The results were depicted in Table 1 and Table 2.

3.1.1. Path a, the effect of AI chatbot acceptance and trust on academic self-efficacy
The first path analysis we conducted was of path a, the path between the predictor and the mediator. Tables 1-2 suggested that the acceptance and trust towards AI chatbots significantly and positively predicts academic self-efficacy. In other words, students who accept and trust AI chatbots more tend to be more confident that they can perform well academically. One point increase of the acceptance and trust towards AI chatbots predicts 9.83 points increase of academic self-efficacy. This thing might be because students can learn more by using AI chatbots, they can clarify what their lecturers said, finding simpler examples, or even ask the chatbot to simplify the language of a difficult concept into the lingo that the students can understand, and in turn, the students' academic self-efficacy is significantly improved. Additionally, Table 1 also

suggested that 76% variance of the improvement in academic self-efficacy was significantly explained by the students' acceptance and trust towards AI chatbots.

Table 1. AI chatbot acceptance and trust on academic self-efficacy model summary

R	R-sq	MSE	F	df1	Df2	p
9.747	.7652	294.8902	267.1810	1.0000	82.0000	.0000

Table 2. AI chatbot acceptance and trust on academic self-efficacy model

Model	Coeff	Se	t	p	LLCI	ULCI
Constant	29.3503	6.7652	4.3384	.0000	15.8920	42.8086
AICB_AT	.8313	.0509		.0000	.7301	.9325

3.1.2. The direct effect of AI chatbot acceptance and trust on societal mattering and the indirect path through academic self-efficacy

The next path analysis was the path c and c', or the direct effect of AICB acceptance and trust on the societal mattering, as well as its indirect effect through self-efficacy. The results are depicted in Table 3 and Table 4. As depicted in Table 3 (on path c), acceptance and trust towards AICB significantly predicts the students' societal mattering, where one point increment of acceptance and trust contributed to about 0.19 points improvement of societal mattering. Furthermore, Table 4 emphasized that the effect of AICB acceptance and trust is stronger when the students' acceptance and trusts towards AICB have improved their academic self-efficacy by 19.52 points. The findings suggested that the academic self-efficacy partially mediates the contribution of acceptance and trust towards AI chatbots on the societal mattering.

Table 3. The direct effect of AICB acceptance and trust on societal mattering

Effect	se	t	p	LLCI	ULCI
.1905	.0443	4.2970	0000	.1023	.2787

Table 4. The indirect effect of AI chatbots acceptance and trust on societal mattering through academic self-efficacy

	Effect	BootSE	BootLLCI	BootULCI
Self-efficacy	.1952	.0948	.0899	.4606

3.2. Discussion

The findings generally highlighted the main problems stated in the beginning of this paper. The presence of AI chatbots, represented by ChatGPT has significantly increased students' academic self-efficacy if they accept and trust it. Furthermore, our findings also offered some explanation on how it occurred; students who accept and trust that ChatGPT might help them with their study would likely to develop higher academic self-efficacy, they believe more that they can perform academically better. Consequently, this belief led them to feel that they matter more to their society. In other words, this finding might solve academic problems rooted from the communication gap between educators and students, low academic efficacy among students [34]. AICB can also bridge the gap between different learning and teaching styles between the students and educators that have been reported to occur frequently among certain cohorts of educators with technological challenges [15]–[17]. It can also be the alternative of information sources for the students [29]. The chatbot might even help the students to test their learning outcome by giving them quizzes [30]. Furthermore, free AICB such as ChatGPT, Google Bard, and Bing Chat, might provide more comprehensive reviews for students who are conducting research for their projects, assignments, or theses.

In other words, positive acceptance towards AICB might solve two major issues experienced by students from countries with advanced internet network but lack of English proficiency, such as many countries in South-East Asia. With language barrier and critical thinking issues solved, students would likely develop better confidence that they will perform academically well and gain good social standing in the future. The findings answered the concern of educators who question the inclusion of ChatGPT or any Chatbot in their teaching and learning system [15]–[17]. The lower acceptance and trust towards new technology predicts flattened performance efficacy [18] and sense of societal mattering [19], [20]. Reversely but accordingly, the results suggested that higher acceptance and trust towards the technology elevates the performance efficacy and therefore, the sense that one matters more to the larger society [22]. Similarly, the

findings also confirmed the critical race theory [17] in a reversed way. While CRT which posits that the disadvantaged members of the society would feel marginalized and worried about being replaced, our results advocated that members of the society who accept, trust and embrace the new technology would gain significantly stronger efficacy and belief that they secure a better significance in the society.

3.2.1. Limitations

There are two limitations that we need to address in this study. First, methodologically, our study was conducted in the manner of cross-sectional, which limits the generalizability of the findings to the similar timeline and demography. The positive attitude of Gen-Z towards the new technology might no longer hold when the Gen-Z grow older and fill the position that currently is being held by their predecessors; they might be reluctant to accept the new technology in the future and be slowly replaced by their offspring generations. Furthermore, our finding calls for deeper explanation and understanding. While we know that our students can develop better societal mattering and academic efficacy when they accept and trust AICB, we need to know further how the mechanism took place, so we can develop intervention modules to improve individuals' technology acceptance, efficacy, or societal mattering. Another limitation is that our sample size was limited. Although the number was suggested by the G*Power Sample Size calculator, a larger size and more various participants might deliver different findings; it is suggested for the future studies to vary the participants based on their socio-economic status, NML, digital literacy, and university majors. Such variables, such as NML and demographic data can also be included in the equation to suggest proper intervention for proper individuals from different background.

3.2.2. Implications

Our finding calls for various practical implication of embracing the AICB technology adoption in the teaching and learning process. Educators should let the students to use the Chatbots to elaborate their classroom explanation in ways or languages that students can understand. They can also use AICB to assist them tutoring certain students who need more intensified and focused trainings. Institutions should take the advantages of AICB technology to make the education more inclusive by bridging the gap of language proficiency, knowledge prerequisite, or teaching and learning styles.

4. CONCLUSION

It can be concluded that the emergence of the highly accessible AICB should not be feared or rejected. Evidently, fear towards it might only be the repetition of human fear towards search engines, internet, and other new technologies, including electricity, wheels, and fire. Most of the fear came from lack of understanding towards the technology. The findings showed that positive acceptance towards AICB is synonymous with the improvement of academic self-efficacy, and eventually the belief within the students that they matter for their society. Therefore, higher education institution should play their roles in introducing proper approaches towards AICB' usage in their learning and teaching programs to for the social befits of the students and their value in the job market once they graduated.

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