



Nudging students to fact-check GenAI outputs: Perspectives from dual process theory and digital literacy

Tran Mai Chi Nguyen and Chei Sian Lee

DOI: <https://doi.org/10.47989/ir31iConf64183>

Abstract

Introduction. Drawing from dual process theory, this study explores the acceptability of digital fact-checking nudges among GenAI users within educational contexts. The study examines differences in the perception towards GenAI fact-checking nudges with heuristic (System 1) or systematic (System 2) mechanisms, where heuristic refers to quick shortcuts and systematic to careful reasoning. This study also examines varying levels of digital literacy in GenAI usage, influencing learners' perceptions of GenAI and their responsiveness to digital nudges.

Method. The study developed digital nudge vignettes tailored to educational settings and assessed their acceptability and perceived effectiveness. Data was collected from 300 university students through an online survey.

Analysis. Quantitative analysis employed descriptive and t-tests comparing nudge perception between users with different levels of digital literacy.

Results. Overall, the level of digital literacy was relatively high among student users. This indicates the familiarity and high tendency that GenAI users can utilise GenAI for learning. System 1 nudges were perceived more positively than System 2 nudges, and digitally literate users showed more favourable attitudes toward nudges.

Conclusion(s). This study highlights the value of heuristic digital nudges and advocates for low-effort, seamlessly integrated interventions that foster fact-checking behaviors among learners when using GenAI for learning.

Introduction

GenAI misinformation is widely recognised as a significant issue in both real-world practice and academic research. Thus, advancing effective interventions to reduce its harmful consequences is critical (Shoaib et al., 2023). To examine a potential intervention to tackle the negative consequences of GenAI misinformation, this paper investigates digital nudging as a means to intervene in the misinformation processing of learners through both heuristic and systematic thinking. Specifically, the study explores differences in perception towards GenAI fact-checking nudges in fostering fact-checking behaviors among learners. Rooted in behavioral economics and human-computer interaction, research on digital nudges explores how they can foster positive behavior change across diverse domains, including healthcare and education (Lee et al., 2024). Prior studies have explored digital nudging to encourage critical evaluation of user-generated content on social media (Bhuiyan et al., 2018) or to prompt information verification before sharing (Pennycook & Rand, 2022), yet there remains a notable gap in research specifically applying digital nudges to facilitate fact-checking of GenAI-generated content, especially from the dual processing perspective.

This study seeks to address existing research gaps. Dual process theory (DPT) distinguishes between two modes of cognitive processing - intuitive (System 1) and analytical (System 2) - that individuals employ in interpreting information (Blackburn, 2016; Chaiken, 1989; Lim & Lee, 2024), thus offering a useful framework for the design and application of digital nudges. System 1 (heuristic processing) involves quick, automatic, and low-effort thinking that utilises shortcuts and existing knowledge, whereas System 2 (systematic processing) is more deliberate, slower, and consumes resources, demanding effort and time to carefully analyze new information (Blackburn, 2016; Chaiken, 1989). Furthermore, this study accounts for varying levels of digital literacy in GenAI usage, as this factor may influence learners' perceptions of GenAI and their responsiveness to System 1 and 2 digital nudges (Chu-Ke & Dong, 2024; Łabuz & Nehring, 2024). Accordingly, the study has two main objectives. The first is to assess learners' acceptance of digital fact-checking nudges designed in alignment with the dual process framework, focusing on their responses to System 1 and System 2-oriented interventions. The second objective is to examine whether learners' digital literacy levels in GenAI usage affect their acceptance of such nudges. DPT is instrumental in guiding this investigation, offering insights into how digital nudges can be tailored to support both intuitive and systematic thinking processes. In line with these objectives, the study aims to address the following research questions: *How do learners perceive the acceptability and effectiveness of digital fact-checking nudges when using GenAI for learning? From the lens of DPT, how do learners' digital literacy in GenAI usage influence their perceptions of fact-checking nudges?*

The paper adheres to the following structure. First, the literature review section covers the theoretical concept of digital nudges, particularly system 1 and system 2 nudges based on the dual process theory and the concept of digital literacy in application for examining GenAI usage. Then, the Methodology section describes in detail the research design, data collection procedure, and measurement. Next, the Findings section reports on the study's results regarding the nudge perception towards fact-checking GenAI responses and the differences in this perception between users with low and high levels of digital literacy. The discussion section follows to discuss the findings and conclude in the conclusion section.

Literature review

System 1 and system 2 digital nudges

In this study, DPT informs the design of digital nudges that target and support two cognitive processes of humans when receiving and processing information. According to DPT, human cognition operates through two distinct but interrelated modes of processing: a fast, intuitive system (System 1) and a slower, more deliberate system (System 2) (Blackburn, 2016; Chaiken, 1989).

The lens of DPT will then be critical to understand the influence of system 1 versus system 2 on contextual factors such as the affordances of AI technologies (Koban & Banks, 2023). Specifically, the first cognitive mechanism, known as System 1 (heuristic processing), involves rapid, automatic, and low-effort thinking that relies on shortcuts, easily interpretable cues, and prior knowledge (Chaiken & Maheswaran, 1994). This mode of processing enables individuals to quickly receive, interpret, and apply information in an intuitive and cognitively convenient manner (Todorov et al., 2002). System 2 (systematic processing) represents a slower, more deliberate cognitive approach characterised by increased dedicated resources, effort, and time to fully understand new knowledge (Chaiken, 1989). This mode involves heightened attention, reflective thinking, and thorough reasoning throughout the information evaluation process (Todorov et al., 2002). Systematic processing has been recognised as a vital mechanism for digital users, particularly when navigating complex or unfamiliar content, and plays an essential role in resisting online misinformation (Yang et al., 2021).

To influence both automatic and reflective cognitive systems, nudging strategies draw upon principles from DPT, which posit that individuals' decisions can vary depending on contextual factors and their cognitive load (Thaler & Sunstein, 2008). Despite the theoretical potential of such approaches, there remains a limited understanding of how to effectively design nudges that encourage fact-checking of GenAI information, particularly within educational settings. Therefore, this study aims to fill this gap by investigating the acceptability and perceived effectiveness of digital fact-checking nudges aligned with heuristic (System 1) and systematic (System 2) processing among learners in a digital learning environment.

Digital literacy in GenAI usage

Digital literacy is conceptualised as the human capability with different digital technologies in information finding, evaluating, and implementing information, along with consuming, creating, and communicating content effectively and thoughtfully (Reddy et al., 2020). The concept covers a broad range of digital interactions and adapts to new and emerging technologies (Ng, 2012). The concept remains a useful foundation for future or emerging technologies (Gilster, 1997) like GenAI.

Digital literacy is explicated in this paper with three primary dimensions, which were elaborated from the conceptual framework by Ng (2012). Three dimensions constituting digital literacy include technical, cognitive, and social-emotional. The first dimension is the technical dimension, indicating human abilities to perform necessary tasks and solve problems on digital devices or systems using technical and operational competence. The second dimension is the cognitive dimension, indicating critical thinking competence to form judgments and actions with careful consideration of multiple obligations, accounting for moral, ethical, and legal liabilities. The third and final dimension is the social-emotional dimension, indicating the ability to prevent and handle cybercrime and cyber risks, and at the same time take responsibility for digital resources and platforms with safety, privacy, and etiquette (Ng, 2012). Here, we examine if digital literacy has an impact on the acceptability and perceived effectiveness of digital fact-checking nudges.

Methodology

Using a quantitative design, an online survey took place from February to March 2025, with approval from the authors' institutional review board (IRB-2024-1052). The participants, all students aged 18 and older from local universities in Singapore, were recruited via email, social media, and posters using convenience sampling. They accessed the Qualtrics platform through a URL or QR code provided in the recruitment materials on their personal devices. Participants provided voluntary consent and had to meet eligibility criteria through two screening questions confirming their age (18 or older) and enrolment status (full-time or part-time). Upon completion, respondents received compensation of 20SGD via an online payment system for their

participation. Although personal identifiers were required for payment, they were not collected or linked to the data analysis.

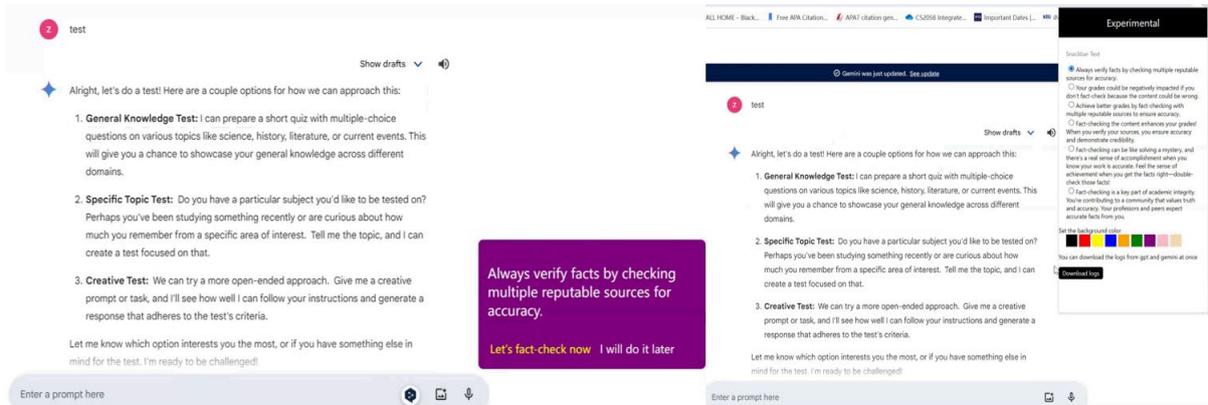


Figure 1. Illustrations of digital nudges implemented to fact-check GenAI responses.

The study drew on previous research to create relevant nudge scenarios tailored to the educational setting (Jung & Mellers, 2016; Lim & Lee, 2022, 2024; Ng, 2012; Reynolds et al., 2019; Reynolds et al., 2018; Tannenbaum et al., 2017; van Gestel et al., 2021). Following prior research, six vignettes, three for each type of System 1 and System 2 nudges (Sunstein, 2016), were designed using informational cues and digital design to illustrate digital nudging in learning environments. A video prototype was shown to participants to demonstrate the nudges and how they worked when interacting with GenAI tools, as illustrated in Figure 1. After watching the video, participants rated the acceptability and perceived effectiveness of these nudges. System 1 nudges focused on fact-checking GenAI information through email notifications, mobile app alerts, and reminders. System 2 nudges provided information on a learner's progress tracking, class standing for assignments, and goal setting. Nudge perception was evaluated through the combination of acceptability and perceived effectiveness. Acceptability was measured with three items (Reynolds et al., 2019): 'How much are you in favour of the initiative being introduced?', 'How acceptable do you find the initiative?', and 'Do you support or oppose the initiative?'. Perceived effectiveness was measured with two items (Reynolds et al., 2019): 'The initiative will help to promote fact-checking when using GenAI for learning,' and 'The new initiative will enhance information accuracy when using GenAI content during learning'. Digital literacy in GenAI usage (Ng, 2012) ($M=5.27$, $SD=.92$, median = 5.44) was assessed using 10 items to evaluate competence in the usage of GenAI tools regarding technical, cognitive, and socio-emotional factors. Responses were rated on a 7-point Likert scale (1=Strongly Oppose; 7=Strongly Support), with the composite score calculated as the average of the items. Participants were categorised into 2 groups based on their level of digital literacy in GenAI usage: high (above median) or low (below median).

Findings

Nudge perception towards fact-checking GenAI responses

The survey yielded 300 valid responses after excluding those that did not meet the age requirement (18 or older), student status, or incomplete measurement items. Among the valid respondents, 43% identified as male, 54% as female, and 2.70% as others. Participants' ages ranged from 18 to 34 ($N=283$, $M=22.20$, $SD=2.04$). Additionally, 88% ($n=264$) were undergraduates, 8.00% ($n=24$) were postgraduates, and 4.00% ($n=12$) were pursuing other diploma levels.

ChatGPT was the most used and preferred GenAI tool. Of GenAI users, 86.62% reported ChatGPT as their most frequently used tool, and 76.47% favoured it above others. The overall level of digital literacy in GenAI was above average, indicating that the sample is relatively literate in the usage of

GenAI tools (M=5.27, SD=.92, skewness = -1.13, kurtosis = 3.15). Among the three dimensions, the cognitive dimension was scored the highest among the users (M=5.43, SD=1.01, skewness =-1.27, kurtosis =3.05), followed by the technical dimension (M=5.24, SD=.98, skewness =-.96, kurtosis =2.14). Socio-emotional is the weakest dimension in the sample's digital literacy (M=4.81, SD=1.18, skewness =-.50, kurtosis =-.496). The internal validity of the scale had a Cronbach's alpha of .88, suggesting that items in the acceptability scale capture a similar concept.

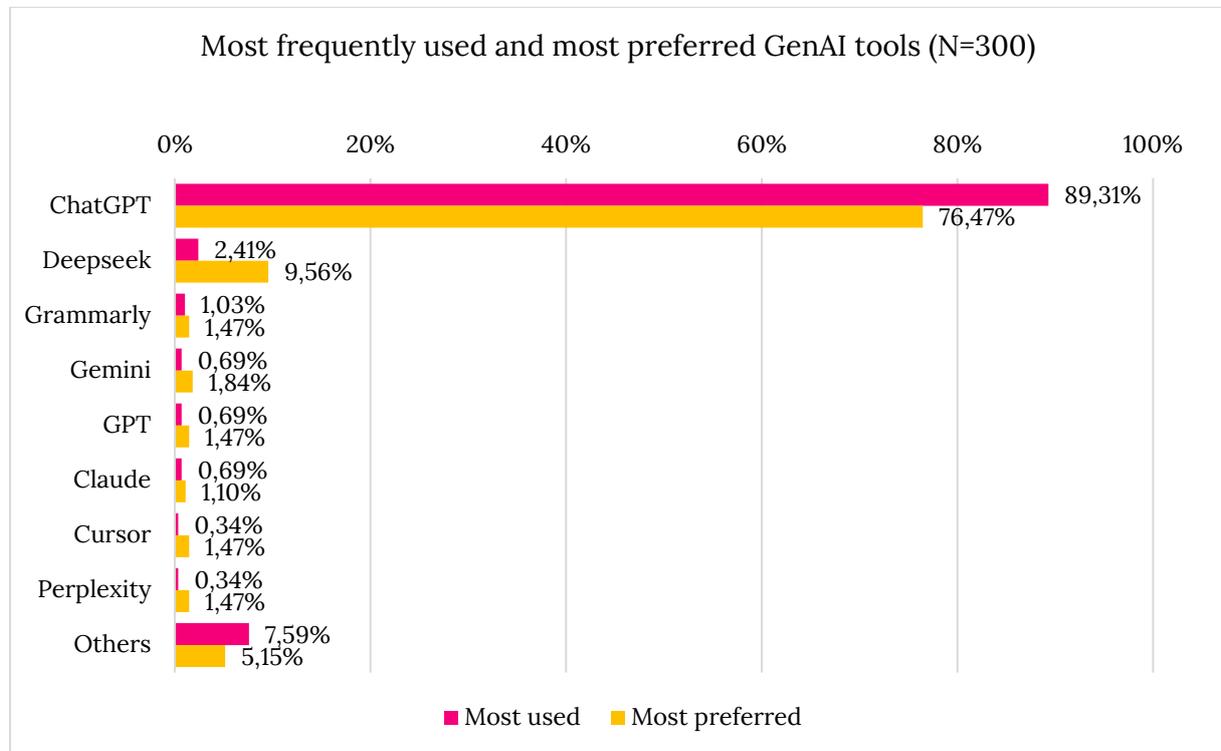


Figure 2. Most frequently used and most preferred GenAI tools.

Nudge acceptability was moderate in general (M=4.95, SD=1.07, skewness =-.77, kurtosis =1.19). The acceptability scale's internal validity across six scenarios showed a Cronbach's alpha of 0.95, indicating that the items consistently measured the same construct. System 1 nudges had higher acceptability (M=5.03, SD=1.16, skewness =-.93, kurtosis =1.26) compared to System 2 nudges, which were slightly above average (M=4.87, SD=1.19, skewness =-.66, kurtosis =.47). The perceived effectiveness of nudges was also moderate (M=5.10, SD=.94, skewness =-.72, kurtosis =1.91), with a Cronbach's alpha of .91 for the effectiveness scale across the six scenarios, suggesting strong internal consistency.

Digital literacy in GenAI usage differences towards System 1 versus System 2 nudging

This study also conducted paired t-tests to compare System 1 and System 2 across nudge acceptability, nudge perceived effectiveness, and nudge overall perception, as reported in Table 1. For nudge acceptability, System 1 (M=5.02, SD=1.16) outperformed System 2 nudges (M=4.87, SD=1.19) across all users ($t(299) = 2.78$, 95% CI= [.05, .26], $p = .006$). Among users with low digital literacy, the difference was not statistically significant ($t(145) = 1.57$, 95% CI= [-.03, .24], $p = .119$) between System 1 (M=4.84, SD=1.04) and System 2 nudges (M =4.73, SD=1.04). However, for users with high digital literacy, System 1 nudges had higher acceptability (M=5.20, SD=1.24) compared to System 2 ones (M=5.00, SD=1.31), and the difference was statistically significant ($t(153) = 2.30$, 95% CI= [.02, .37], $p = .023$). For nudge perceived effectiveness, System 1 (M=5.18, SD=1.03) again were significantly higher than System 2 nudges (M=5.00, SD=1.05) across all users ($t(299) = 3.42$, 95% CI=

[.08, .28], $p < .001$). Among low digital literacy users, System 1 scored higher ($M=4.97$, $SD=.95$) than System 2 nudges ($M=4.81$, $SD=.95$). For high digital literacy users, System 1 nudges were also perceived to be more effective ($M=5.39$, $SD=1.07$) versus System 2 nudges ($M=5.19$, $SD=1.12$). The differences were both significant for System 1 ($t(145) = 2.41$, 95% CI = [.03, .28], $p=.017$) and System 2 nudges ($t(153) = 2.46$, 95% CI = [.04, .36], $p=.015$).

	System 1 nudges		System 2 nudges		M	SD	95% CI	df	t (298)	p
	M	SD	M	SD						
Nudge acceptability										
All users	5.02	1.16	4.87	1.19	.15	.96	[.05, .26]	299	2.78*	.006
Low digital literacy	4.84	1.04	4.73	1.04	.11	.83	[-.03, .24]	145	1.57 ns	.119
High digital literacy	5.20	1.24	5.00	1.31	.20	1.07	[.02, .37]	153	2.30*	.023
Nudge perceived effectiveness										
All users	5.18	1.03	5.00	1.05	.18	.91	[.08, .28]	299	3.42*	<.001
Low digital literacy	4.97	.95	4.81	.95	.16	.77	[.03, .28]	145	2.41*	.017
High digital literacy	5.39	1.07	5.19	1.12	.20	1.02	[.04, .36]	153	2.46*	.015

Note. * $<.05$; ns=not significant.

Table 1. Paired t-test results comparing System 1 and System 2 nudging in acceptability, effectiveness, and perception.

Discussion

This study explores how learners perceive and accept fact-checking nudges within digital learning environments, aiming to identify groups most likely to embrace these interventions. In terms of GenAI usage, students exhibit a moderate level of engagement in educational contexts, with conversational AI tools like ChatGPT and DeepSeek being the most popular. This can be due to the emerging popularity and accessibility of ChatGPT and DeepSeek for higher education, as well as the ongoing technology development of the tool that meets students' demand for academic support (Kotsis, 2025; Zhang & Yang, 2025). This reflects the growing integration of GenAI into students' academic experiences, signalling a shift toward innovative educational practices. Moreover, the level of digital literacy was relatively high among the sampled users, indicating the familiarity and high tendency that GenAI users have to make use of GenAI tools for learning purposes. While this creates opportunities for more tailored and enriched educational experiences, it also raises concerns about misinformation and academic integrity risks, underscoring the need for effective strategies to mitigate these challenges.

Regarding how learners perceive the acceptability and effectiveness of digital fact-checking nudges when using GenAI for learning, System 1 nudges were perceived more positively than System 2 nudges, aligning with findings from prior studies on nudge perception across various contexts (Lim & Lee, 2022, 2024). This preference may stem from the demographic profile of the participants, as younger, digitally adept university students tend to favour quick, intuitive solutions (Dimock, 2019). The appeal of System 1 nudges highlights the importance of simplicity and ease in designing effective nudges. Moreover, in terms of learner digital literacy in GenAI usage's influence on perception of fact-checking nudges, digital literacy significantly influences nudge perception, with GenAI digitally literate users showing more favourable attitudes toward nudges compared to those with lower literacy. Interestingly, highly literate users, due to their extensive experience and frequent use of digital tools like GenAI, are more aware of misinformation risks (Chu-Ke & Dong, 2024), leading to a stronger appreciation for fact-checking nudges. Their advanced literacy fosters

greater familiarity and expertise, enabling them to engage in systematic and analytical thinking rather than relying solely on intuitive, passive processing. In contrast, less literate users, who often seek quick answers from GenAI during learning, exhibit less favourable perceptions and acceptance of digital nudges. A plausible explanation is that with limited experience and familiarity with these technologies, they may lack the confidence or skills to engage in analytical thinking or critically evaluate information provided by GenAI (Chen et al., 2024; Chu-Ke & Dong, 2024).

Digital literacy acts as an essential bridge between quick, instinctive System 1 thinking and slow, thoughtful System 2 thinking, especially regarding misinformation and Generative AI. It is not merely a mechanism for verifying facts; instead, it serves as a cognitive framework that shapes users' understanding of information. The digital landscape, characterised by its swift pace and emotionally impactful content, is created to provoke System 1's automatic and heuristic responses. This situation leaves users vulnerable to misinformation, as they may rely on cognitive shortcuts instead of engaging in thorough analysis. On the other hand, digital literacy equips individuals with the necessary skills to engage System 2's more systematic approach, allowing them to counter these immediate impulsive responses. This relationship was outlined by DPT and has been found to be significant in information processing research (Chaiken & Ledgerwood, 2012). Individuals with strong digital literacy are driven by a desire for accuracy, which encourages them to go beyond shallow, heuristic processing. This drive represents a fundamental element of critical literacy, an essential aspect of digital literacy (Ng, 2012). By honing critical thinking abilities, users can better partake in the systematic and effortful processing needed to assess information from various sources and discern reliable data (Molerov et al., 2020). Consequently, digital literacy not only facilitates fact-checking; it also fundamentally alters how users approach cognition. It enables individuals to transition from System 1 to System 2 processing, allowing them to strategically navigate and analyze information efficiently within a complicated digital arena. This enhances their ability to resist potential misinformation from platforms like Generative AI.

Indeed, digital literacy has been found to be one of the key factors that can drive positive behavioral outcomes against misinformation (Ferrucci & Hopp, 2023). Especially with GenAI usage, digital literacy is emphasised in research as a potential solution to integrate into training and education for GenAI users (Chu-Ke & Dong, 2024). For students who use GenAI for learning purposes, the competence to critically assess AI-generated content can drive fact-checking behaviors through multiple methods and sources of information, which is a crucial value of digital literacy in GenAI usage (Walczak & Cellary, 2025). Digital literacy has also been a key determinant for educational training to improve verification processes of online misinformation across different contexts, for instance, in Europe and Asia (Sultanbayeva et al., 2024). This study's results resonate with the call to increase investment in digital literacy among learners in higher education, especially among students as GenAI users. Put differently, we should not assume that university students are highly digitally literate; this common assumption can, in fact, be a misconception.

Conclusion

Based on DPT, this research aims to address existing knowledge gaps by examining how GenAI users within educational settings react to digital fact-checking nudges. Drawing from DPT principles, the research investigates how perceptions of GenAI fact-checking nudges differ when processed through a heuristic (System 1) or a systematic (System 2) approach. Additionally, this study considers varying levels of digital literacy in GenAI usage, recognising that this variable may impact learners' views of GenAI and their responsiveness to digital nudges.

The study provides both theoretical and practical insights for designing effective fact-checking nudges for GenAI information in educational settings. Theoretically, it fills a gap in cognitive processing research, especially in DPT, by exploring nudge design for learning and fact-checking within GenAI contexts. It also introduces digital nudges and GenAI digital literacy as theoretical frameworks implied from DPT, with the potential to explain and assess their role in combating

GenAI misinformation. Practically, the study suggests focusing on System 1 nudges, such as mobile app alerts, email notifications, and timely reminders, which deliver seamless, low-effort solutions to minimise cognitive overload when engaging with GenAI content. Moreover, the study calls for a stronger focus and investment from educational policymakers and educators to design, implement, and sustain effective programs that enhance students' digital literacy in the long run as a solution against GenAI misinformation.

The study has limitations that point to future research directions. First, the sample was relatively uniform, consisting solely of university students, which may limit the findings' applicability. Future research could explore diverse learning environments, such as informal learning or professional training, to develop nudges that promote lifelong learning. Second, the study used generic, context-neutral nudges, which may not account for personalised nudges. Specifically, investigating personalised nudges tailored to users' skills and expertise is an important research extension. Third, reliance on self-reported surveys introduces potential bias from participants' social desirability. To better evaluate System 1 and System 2 nudge effectiveness, future studies could employ experimental or observational methods for more robust and precise measurements. Despite these limitations, this study offers valuable early insights as one of the first to investigate how digital nudging can promote fact-checking behaviors among learners in higher education.

Acknowledgements

This research is supported by the National Research Foundation, Singapore under its AI Singapore Programme (AISG Award No.: AISG3-GV-2023-013).

About the authors

Tran Mai Chi Nguyen is a master's Research student at the Wee Kim Wee School of Communication and Information, Nanyang Technological University, Singapore. Her research interests include digital literacy and misinformation in digital contexts. She can be contacted at nguyentr004@e.ntu.edu.sg

Chei Sian Lee is Professor of information at the Wee Kim Wee School of Communication and Information, Nanyang Technological University in Singapore. Her current research centers on generative AI and digital nudging, aiming to enhance engagement and learning through an information-driven approach. She can be contacted at leecs@ntu.edu.sg

References

- Bhuiyan, M. M., Zhang, K., Vick, K., Horning, M. A., & Mitra, T. (2018). FeedReflect: A tool for nudging users to assess news credibility on twitter. Companion of the 2018 ACM conference on computer supported cooperative work and social computing,
- Blackburn, S. (2016). Dual process theory. In *A Dictionary of Philosophy*.
- Chaiken, S. (1989). Heuristic and systematic information processing within and beyond the persuasion context. *Unintended Thought: Limits of Awareness, Intention, and Control/Guilford*.
- Chaiken, S., & Ledgerwood, A. (2012). A theory of heuristic and systematic information processing. *Handbook of theories of social psychology*, 1, 246-266.
- Chaiken, S., & Maheswaran, D. (1994). Heuristic processing can bias systematic processing: effects of source credibility, argument ambiguity, and task importance on attitude judgment. *Journal of personality and social psychology*, 66(3), 460.

- Chen, K., Tallant, A. C., & Selig, I. (2024). Exploring generative AI literacy in higher education: student adoption, interaction, evaluation and ethical perceptions. *Information and Learning Sciences*. <https://doi.org/10.1108/ils-10-2023-0160>
- Chu-Ke, C., & Dong, Y. (2024). Misinformation and Literacies in the Era of Generative Artificial Intelligence: A Brief Overview and a Call for Future Research. *Emerging Media*, 2(1), 70-85. <https://doi.org/10.1177/27523543241240285>
- Dimock, M. (2019). *Defining generations: Where millennials end and generation Z begins*. Pew Research Center. <https://www.pewresearch.org/short-reads/2019/01/17/where-millennials-end-and-generation-z-begins/>
- Ferrucci, P., & Hopp, T. (2023). Let's intervene: how platforms can combine media literacy and self-efficacy to fight fake news. *Communication and the Public*, 8(4), 367-389. <https://doi.org/10.1177/20570473231203081>
- Gilster, P. (1997). *Digital literacy*. John Wiley & Sons, Inc.
- Jung, J. Y., & Mellers, B. A. (2016). American attitudes toward nudges. *Judgment & Decision Making*, 11(1), 62-74. <https://doi.org/10.1017/S1930297500007592>
- Koban, K., & Banks, J. (2023). Dual-Process Theory in Human-Machine Communication. In (pp. 302-309).
- Kotsis, K. T. (2025). ChatGPT and DeepSeek evaluate one another for science education. *EIKI Journal of Effective Teaching Methods*, 3(1).
- Łabuz, M., & Nehring, C. (2024). Information apocalypse or overblown fears—what AI mis- and disinformation is all about? Shifting away from technology toward human reactions. *Politics & Policy*, 52(4), 874-891. <https://doi.org/10.1111/polp.12617>
- Lim, K. K., & Lee, C. S. (2022). Nudging learning behaviour: A systematic review. *Proceedings of the Association for Information Science and Technology*, 59(1), 744-746. <https://doi.org/10.1002/pra2.712>
- Lim, K. K., & Lee, C. S. (2024). Acceptability of Nudge in Digital Learning Environment. *Proceedings of the Association for Information Science and Technology*, 61(1), 564-569.
- Molerov, D., Zlatkin-Troitschanskaia, O., Nagel, M.-T., Brückner, S., Schmidt, S., & Shavelson, R. J. (2020). Assessing university students' critical online reasoning ability: A conceptual and assessment framework with preliminary evidence. *Frontiers in Education*,
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065-1078.
- Pennycook, G., & Rand, D. G. (2022). Nudging social media toward accuracy. *The Annals of the American Academy of Political and Social Science*, 700(1), 152-164.
- Reddy, P., Sharma, B., & Chaudhary, K. (2020). Digital literacy: A review of literature. *International Journal of Technoethics (IJT)*, 11(2), 65-94. <https://doi.org/10.4018/IJT.20200701.oa1>
- Reynolds, J. P., Archer, S., Pilling, M., Kenny, M., Hollands, G. J., & Marteau, T. M. (2019). Public acceptability of nudging and taxing to reduce consumption of alcohol, tobacco, and food: A population-based survey experiment. *Social Science & Medicine*, 236, 112395. <https://doi.org/10.1016/j.socscimed.2019.112395>
- Reynolds, J. P., Pilling, M., & Marteau, T. M. (2018). Communicating quantitative evidence of policy effectiveness and support for the policy: Three experimental studies. *Social Science & Medicine*, 218, 1-12. <https://doi.org/10.1016/j.socscimed.2018.09.037>
- Shoaib, M. R., Wang, Z., Ahvanooy, M. T., & Zhao, J. (2023). Deepfakes, misinformation, and disinformation in the era of frontier AI, generative AI, and large AI models. 2023 International Conference on Computer and Applications (ICCA),
- Sultanbayeva, G., Akynbekova, A., Belgarayeva, A., Buyenbayeva, Z., & Ashimova, A. (2024). Digital Literacy as a Tool for Identifying Fake News: A Comparative Analysis Using the Example of European and Kazakh Media. *Journal of Information Policy*, 15. <https://doi.org/10.5325/jinfopoli.15.2025.0001>
- Sunstein, C. R. (2016). People prefer system 2 nudges (kind of). *Duke Law Journal*, 66(1), 121-168. <http://www.jstor.org/stable/44155309>

- Tannenbaum, D., Fox, C. R., & Roggers, T. (2017). On the misplaced politics of behavioural policy interventions. *Nature Human Behaviour* 1(7), 1-7. <https://doi.org/10.1038/s41562-017-0130>
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
- Todorov, A., Chaiken, S., & Henderson, M. D. (2002). The heuristic-systematic model of social information processing. *The persuasion handbook: Developments in theory and practice*, 23, 195-211.
- van Gestel, L. C., Adriaanse, M. A., & de Ridder, D. T. D. (2021). Who accepts nudges? Nudge acceptability from a self-regulation perspective. *PLoS one*, 16(12), e0260531. <https://doi.org/10.1371/journal.pone.0260531>
- Walczak, K., & Cellary, W. (2025). Navigating Risks: Inaccuracies, Bias, Disinformation, and Privacy in Educational AI. In *Teaching and Learning in the Age of Generative AI* (pp. 163-194). Routledge.
- Yang, J. Z., Dong, X., & Liu, Z. (2021). Systematic Processing of COVID-19 Information: Relevant Channel Beliefs and Perceived Information Gathering Capacity as Moderators. *Science Communication*, 44(1), 60-85. <https://doi.org/10.1177/10755470211044781>
- Zhang, M., & Yang, X. (2025). Google or ChatGPT: Who is the better helper for university students. *Education and Information Technologies*, 30(4), 5177-5198.

© [CC-BY-NC 4.0](#) The Author(s). For more information, see our [Open Access Policy](#).