


## A study of Hong Kong undergraduate students' use of DeepSeek



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### ABSTRACT

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The study explores how Hong Kong undergraduate students utilize DeepSeek in their academic endeavors. Existing literature predominantly focuses on ChatGPT in tertiary education, leaving a research gap regarding DeepSeek's usage among undergraduate students in Hong Kong. This study employs the theoretical framework of 'Philosophers of Technology' as a guiding lens. The methodology involves a modified technolinguistic biography. This study has modified the original biography for AI-situated literacy studies and conducted the AI-technobiography in interview format. This study aims to investigate: 1) how Hong Kong undergraduate students use DeepSeek in their studies, if at all, and 2) the impacts of DeepSeek on the studies of Hong Kong undergraduate students. Findings show that: 1) students deploy DeepSeek to facilitate essay writing, look for definitions of academic jargon, and summarize course readings; and 2) the emergence of DeepSeek has sparked opportunities for them to reflect upon the ethical implications of generative AI. This study enhances the original theoretical framework of "Philosophers of Technology" by advocating a new category: "youth/students as philosophers-practitioners." The study modifies the ethnographic approach and demonstrates the viability of adapting and deploying ethnographic methods originally designated for digital literacy studies into AI-mediated literacy studies.

**Contribution/ Originality:** This study contributes to the existing literature by investigating the underexplored use of DeepSeek among Hong Kong undergraduate students. Employing a modified technolinguistic biography, it offers a novel methodological approach and enhances the "Philosophers of Technology" framework, introducing "youth/students as philosophers-practitioners" to reflect the ethical implications of generative AI.

## 1. INTRODUCTION

This study investigates Hong Kong undergraduate students' use of generative AI in their studies. Since late November 2022, OpenAI's release of generative AI ChatGPT has extensively impacted different aspects of society, including higher education (Cheng & Yim, 2024). OpenAI's Chinese counterpart, DeepSeek, released its latest AI model, 'DeepSeek-R1', in January 2025. While there is existing literature on ChatGPT and its relation to tertiary education settings (e.g., (Abbas, Jam, & Khan, 2024; Chan & Hu, 2023; Cheng & Yim, 2024)) for research with a Hong Kong focus, there is a dearth of research on undergraduate students' use of DeepSeek in their studies, particularly within the context of Hong Kong. This study fills the existing research gap.

The present study is inspired by Higgs and Stornaiuolo (2024) "Being Human in the Age of Generative AI: Young People's Ethical Concerns about Writing and Living with Machines" and draws upon their insights. The same theoretical framework "Philosophers of technology" was applied as Higgs and Stornaiuolo (2024) did in their studies. This paper

also taxonomizes the codebook similarly to how they did in their studies (refer to sections 2: literature review and 4: methodology below for details).

This study comprises six sections. Section 1 provides an overview of the paper. Section 2 (literature review) introduces DeepSeek and its implications for studies. Subsequently, the paper introduces the theoretical framework “*Philosophers of Technology*” by Vakil and McKinney (2022) and delineates its relation to this study. The section also explains (Lee & Barton, 2013)’s ‘techno-biography’ and its potential application in AI-situated literacy research. The paper then elaborates on the methodologies, addresses ethical concerns, and delineates the procedures of data processing and analysis in Sections 3 and 4. The next section discusses and analyzes the collected data and aligns them with the theoretical framework in Section 5. Finally, Section 6 presents conclusions, outlines the study's limitations, and suggests future research directions.

This research contributes to the understanding of Hong Kong undergraduate students' use of generative AI in their studies. Readers of this paper may understand how and why Hong Kong undergraduate students deploy DeepSeek in their studies. They may also have an overview of students’ critical reflections and considerations as they deploy AI in their studies.

## 2. LITERATURE REVIEW

### 2.1. Generative AI

#### 2.1.1. Background of DeepSeek

It is necessary to introduce DeepSeek, the platform that participants in this research deploy in their studies. DeepSeek is a Chinese AI company that develops large language models (LLMs) (Ng, Drenon, Gerken, & Cieslak, 2025). DeepSeek has released various AI models, including "DeepSeek-R1," which has captured extensive media coverage since its launch in January 2025 (Ng et al., 2025). Commentators view DeepSeek’s generative AI model as a rival to its American counterpart, ChatGPT by OpenAI (Fraser, 2025).

While ChatGPT is a popular generative model that has had a significant impact worldwide, and has numerous active users in Hong Kong (Cheng & Yim, 2024), OpenAI has restricted access to ChatGPT in certain regions, including Hong Kong<sup>1</sup>. Users require Virtual Private Network (VPN) to access ChatGPT. Since not every undergraduate student has subscribed to VPN and the fact that ChatGPT is *per se* an AI model with restricted access, it is reasonable to believe that most Hong Kong undergraduate students may opt for DeepSeek (an alternative where Hong Kong users may freely access) instead of ChatGPT. Moreover, DeepSeek released their model in recent months, and there is little existing literature discussing DeepSeek and its relation to higher education settings. Hence, I decided to investigate Hong Kong undergraduate students’ use of generative AI in this study.

#### 2.1.2. Deployment of Gen AI in Studies

Numerous scholars have discussed students’ deployment of generative AI in studies. For instance, Tajik and Tajik (2023) elaborated on how students, teachers, and systems/institutions deployed ChatGPT. For instance, Tajik and Tajik (2023) reported that from the students’ perspective, ChatGPT is a ‘learning companion’ that may facilitate students’ understanding of scientific and mathematical concepts. These concepts can sometimes be abstract; with apt examples, students may better comprehend these vague notions<sup>2</sup>. ChatGPT provides extensive definitions of most abstract concepts and concrete real-life examples to facilitate a deeper understanding of abstract notions.

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<sup>1</sup> See OpenAI’s list of supporting countries and territories <https://platform.openai.com/docs/supported-countries> for the full list of regions where people can access ChatGPT.

<sup>2</sup> Tajik and Tajik (2023) stated that occasionally ChatGPT may oversimplify and wrongly explain some of the abstract concepts.

Research Question One (RQ 1) of this study focuses on revealing how Hong Kong undergraduate students deploy DeepSeek in their studies. In the initial stage of the study, it is wondered whether the students deployed DeepSeek in a similar fashion to ChatGPT or if there are differences. Section 5.1 will further delineate this.

## 2.2. Theoretical Framework: 'Philosophers of Technology' (582)

'Philosophers of technology' (Vakil & McKinney, 2022) was mentioned in Higgs and Stornaiuolo (2024), where they deployed this framework in an analysis of high school students and their use of AI in their everyday lives. In this study, the same framework was deployed to analyze Hong Kong undergraduate students' use of generative AI. This section will first introduce the previous philosophical perspectives (Vakil & McKinney, 2022) drew upon when they developed 'philosophers of technology.' The theoretical framework and its relation to the research questions and methodologies will also be explained.

Vakil and McKinney (2022) reviewed three philosophical camps with different perspectives on the relations between youth and technology. The present study has scrutinized the thinking of the three camps and generally summarized their philosophical perspectives, including the interrelations between these camps.

- Youth as advanced users (P.338): This philosophical camp primarily perceives youth as skillful users of technology. Supporters of this view see technology as a necessary skill for youths' education and workplace success. Youth students need to be 'advanced' (i.e., highly proficient) in cutting-edge technologies to thrive in their lives, such as achieving success within education and launching a successful career trajectory. Supporters of this camp believe that, on a pedagogical level, institutions should identify and teach useful technology that benefits youth (i.e., helps increase youth's attainment of academic and career success), and students should passively consume or learn the selected knowledge. Supporters of this philosophy perceive students as passive consumers of technological knowledge and do not emphasize students creating or contributing their own innovations to existing technologies. Students/youth who follow this philosophy may aim to master technology to achieve specific goals for instance, enhancing study efficiency and obtaining better grades.
- Youth as skilled producers (P.338-339): Unlike the above-mentioned philosophical camp, supporters of this perspective do not perceive youth as passive consumers of technologies. They believe educators and institutions should promote youth as innovative creators who can leverage technological knowledge to design new technologies or even revolutionize existing technologies. On a pedagogical level, students learn existing technology (e.g., coding, graphic design) to unleash students' creative and intellectual capacities. In the long run, there may be a possibility for these creative youth to produce or even revolutionize new technologies.
- Youth as critical agents of technology (P.339-340): Supporters of this philosophical camp view youth as critical agents capable of utilizing technology to catalyze social, cultural, or political transformation. While supporters of this philosophical camp also agree with the view of youth as coders, designers, or engineers (just like the 'youth as the skilled producers' camp above), supporters of this camp view activists who are capable of applying their technological know-how toward liberatory and social justice ends (i.e., relating science and tech to humanities)—for instance, creating social justice apps and websites (Van Wart, Lanouette, & Parikh, 2020). In other words, supporters of this camp believe that youth are not passive assimilators of technology (as supporters of 'youth as the advanced users' camp claim) and creators/innovators of existing technological knowledge (as supporters of 'youth as the skilled producers' camp assert), but also capable of utilising and creating new technological knowledge/ technological products to catalyse social transformation and attain social justice, among other concerns of the humanities. Vakil and McKinney (2022) further developed on 'youth as critical agents of technology' as they build their philosophical framework - 'Youth as philosophers of technology', viewing

youth as philosophers who can contemplate the ethical and moral dimensions of technology. As Vakil and McKinney (2022) explained (in original text<sup>3</sup>).

*“Youth as philosophers of technology decenters without devaluing core computing practices such as design, making, coding (i.e., acknowledging the insights of ‘youth as skilled producers’ philosophical camp) and tinkering to instead foreground learning how to decode and unmake tech’s relationship with power through artistic, moral, and humanistic inquiry (i.e., acknowledging the insight of ‘Youth as critical agents of technology’ camp, and showing they build their philosophical framework by tinkering on the third philosophical camp). What is privileged pedagogically is youth learning to engage with the multiple truths, contested meanings, and ethical implications of technology in local and global contexts (i.e., the main idea of ‘Youth as philosophers of technology’).”*

In other words, Vakil and McKinney (2022) view youth not merely as either users or producers of technology. From their perspective, they see youth as activists capable of transcending technological knowledge (e.g., STEM: Science, Technology, Engineering, and Mathematics) to humanities ends (e.g., attaining social justice). Furthermore, they advance this perspective by proposing that youth are active philosophers capable of contemplating and critically reflecting on ethical and moral complexities (i.e., capable of critically philosophising)<sup>4</sup>/ reflecting upon technologies with a humanities process/mindset of technology<sup>5</sup>.

RQ1 discusses how these students use DeepSeek in their studies. They all reported deploying DeepSeek in their studies (see section 5.1 for details), but do they neglect ethical considerations as they deploy AI in their writing assignments, or would they critically reflect on the ethical and moral implications of AI? It is initially speculated if these students would utilize AI as a means to improve grades and want to be proficient in AI in as to attain academic success (like the perspectives of ‘Youth as advanced users’) and/or to achieve technological advancements (like the viewpoint of ‘Youth as skilled producers’). Or do they deploy AI in a way as Higgs and Stornaiuolo (2024) recognized, or are they capable of actively and critically reflecting on their AI-practices as *philosophers*, as Higgs and Stornaiuolo (2024) recognized? (or from the perspective of Vakil and McKinney (2022), have they already become ‘*philosophers of technology*’)? RQ 2 discusses whether AI’s impact on studies (i.e., by comparing students’ academic practices before and after the viral spread of generative AI) may stimulate students’ active and critical reflection on generative AI and whether that qualifies them as ‘*philosophers of technology*’.

### 2.3. Potential Applications of Lee and Barton (2013) ‘Technolinguistic Biography’ in AI-Situated Literacy Research

It is increasingly common to deploy ethnographic methods in AI-mediated literacy studies van Voorst and Ahlin, 2024). In this study, the inspiration is from Lee and Barton’s (2013) *technobiography*, an ethnographic method to research digital literacy practices, as this study develops the *AI-technobiography* (Appendix C). While the original techno-biography (Appendix B) is helpful in eliciting people’s opinions of their technology-related lives, it is believed that it is just an umbrella framework to elicit data for digital literacy practices across various platforms, and researchers must amend the categories to fit niche research focuses. Moreover, Lee and Barton’s (2013) original intent of designing this method was to collect data regarding digital literacy practices, but not AI-mediated literacy practices. The present study advocates modifying the original categories of the techno-biography into AI-technobiography, a method that centers on probing into undergraduates’ practices of using generative AI (DeepSeek) in their studies.

The present study has deleted “participation,” “a day in life,” and “cross-generational comparisons” from the original techno-biography, as they are irrelevant to the current research. In the original “participation” category, participants shared their previous experiences using the web (e.g., uploading photos and videos on social media and

<sup>3</sup> I include personal interpretations of the original text in parentheses.

<sup>4</sup> Note that philosophising *per se* is a core activity within the studies of humanities (UNESCO, 2025).

<sup>5</sup> In this study “the technology” would be generative AI/ DeepSeek.

editing wiki entries), which is irrelevant to the current study that focuses on AI literacy practices in the context of academic studies. This study does not focus on students' use of AI in a single day, and “a day in life” has also been omitted. As this study does not involve a cross-generational comparison of the use of AI, “cross-generational comparisons” is also considered irrelevant.

The remaining categories have also been modified to fit an AI-literacy context to meet the needs of the current study. The development of *AI-technobiography* is guided by the research questions, and there are four categories in total. ‘*Current practices of AI*’ is developed from “current practices” from the original techno-biography. Instead of asking participants which websites they use often, the present study has narrowed the focus to the ways they deploy DeepSeek in their studies. The same question also queries whether they have ever critically reflected on ethical aspects of AI in studies. The second category, ‘*Life history of using generative AI*’, is modified from ‘Life history’. ‘*Transitions in the era of AI*’ and ‘*Students’ studies in the age of AI*’ have similar overlaps and are modified from ‘Transitions’ and ‘Domains of Life’ from the original model, respectively. As this study focuses on the domain of studies, participants are not asked to share the impact of AI on other domains of life. After completing all sections of AI-technobiography, data examples most relevant to the research questions are extracted from the categories of the AI-technobiography and delineated specifically.

### 3. RESEARCH QUESTIONS (RQs) AND OBJECTIVES

The study focuses on investigating Hong Kong undergraduate students' use of generative AI in their studies. There are two research questions (RQ 1-2).

RQ 1: How are Hong Kong undergraduate students using DeepSeek in their studies, if at all?

RQ 2: What are the impacts of DeepSeek on the studies of Hong Kong undergraduate students?

Generally speaking, Section 5.1 discusses how and why Hong Kong undergraduate students use AI in their studies and corresponds to RQ 1. Section 5.2 mainly focuses on examining the impacts of DeepSeek on their studies and corresponds to RQ 2. After analyzing the data examples in Sections 5.1 and 5.2, it is reasonable to conclude these students as “*philosophers of technology*”. Instead of opening a separate section discussing these students’ AI writing considerations and ethical reflections, this paper delineates their AI writing considerations and ethical reflections after elaborating on how and why these students deploy AI in their studies.

The research critically reflects on the concept of the “*philosophers of technology*” and attempts to further develop the framework in Section 5.3. Lastly, this study also serves as a pilot study to investigate the feasibility of deploying “*AI-technobiography*” (details in Section 2.3 above) in upcoming AI-mediated digital literacy studies. I will explain this in Section 5.4.

### 4. METHODOLOGY

#### 4.1. Study Design

This study adopts a qualitative approach. All participants signed the consent forms before completing 1) the pre-interview surveys and participating in 2) AI-technolinguistic biography interviews. Higgs and Stornaiuolo (2024) also adopted a qualitative approach and incorporated surveys into their study. However, their study adopts different methodologies, integrating 1) pre-focus group surveys and 2) focus groups (instead of interviews). Edley, Litosseliti, and Moss (2025) stated, ‘*researchers often use interviews and focus groups over other research methods to understand multiple views, motivations, and perceptions on a given topic and to explore participants.*’ This study partly aims to understand Hong Kong undergraduate students' perceptions of ethical considerations (i.e., perceptions of the ethical aspects) of using DeepSeek in their studies. While a focus group is equally helpful for the study, I believe conducting interviews is a better method for this study. It is also easier to obtain deeper insights by conducting individual interviews rather than focus groups (Gill, Stewart, Treasure, & Chadwick, 2008). With a small number of participants and the aim of

obtaining in-depth narratives, I believe conducting interviews is the most appropriate qualitative research method for this study.

The pre-interview survey aims to obtain an overview of the demographic details (questions 1-5) and a preliminary understanding of how Hong Kong students use AI in their studies (question 6). Question 4 requires participants to fill in their current university major. At the initial stage of the study, it is wondered if different study majors may affect students' ways and motives for deploying AI in their studies. Moreover, it is speculated that humanities majors may show deeper critical reflections on AI ethics (more likely to be 'philosophers of technology'), as their majors involve more reading and writing. In contrast, do STEM majors downplay the importance of AI ethical concerns? I will further explain in Sections 5.1 and 5.2. Question 5 confirms the eligibility to participate in the research they must be active DeepSeek users (see Section 4.2 below). Question 6 provides a preliminary overview of how these students deploy AI in their studies, where I will ask them to further explain their choices in the interviews.

While it was possible for participants to complete the *AI-technobiography* by themselves, they were assisted in completing the biographies through an interview format. A semi-structured approach was adopted in the interviews as it provided a framework while allowing flexibility for follow-up questions and obtaining a deeper understanding of the interviewees' experiences and opinions (see Adeoye-Olatunde and Olenik (2021)) for the benefits of semi-structured interviews. Consequently, the original techno-biography was adapted into semi-structured interview questions to encourage interviewees to share their thoughts and experiences. The interviews occasionally deviated from the predetermined questions, and students were invited to elaborate further on certain categories of the *AI-technobiography*.

Together, the above-mentioned methods constitute a rich and comprehensive *AI-technobiography*. This extensive data set allows us to gain deeper insights into Hong Kong undergraduates' use of generative AI (DeepSeek) in their studies.

#### 4.2. Sampling

People must meet the following criteria to become participants in the current study: 1) they must be current undergraduates at one of the existing public universities in Hong Kong, and 2) they must have experience deploying DeepSeek in their studies.

Sixteen Hong Kong undergraduate students (N=16) were invited to participate in the current study. The participants were recruited through snowball sampling. Existing study subjects recruited future subjects from among their acquaintances in their respective institutions. To enhance the diversity of the study population, participants were recruited from all years of study and different majors for data contribution. In the pre-interview surveys, all respondents provided basic demographic information (Table 1).

**Table 1.** Demographic details of participants.

Participants	Sex (M/F)	Age	Year of studies	Major	Active user of DeepSeek? (Y/N)
A	M	22	Third year	Social work	Y
B	M	19	Second year	Psychology	Y
C	M	18	First year	Mechanical engineering	Y
D	F	21	Final year	English education	Y
E	F	20	Second year	History	Y
F	F	22	Final year	Sociology	Y
G	M	21	Second year	Computer science	Y
H	F	20	Third year	English education	Y
I	M	19	Second year	Sociology	Y
J	F	21	Third year	Economics	Y
K	M	22	Final year	Electrical engineering	Y
L	F	18	First year	Psychology	Y
M	F	20	Second year	Biomedical science	Y
N	M	21	Third year	History	Y
O	F	22	Final year	Computer science	Y
P	M	18	First year	Social work	Y

All participants of the survey partook in the interviews.

#### 4.3. Ethical Concerns

Consent was sought from all participants before they participated in the study. They were notified that all shared content was solely used for the current research. To protect the privacy of all research participants, pseudonyms were assigned to all of them. When parts or whole sections of content from interviewees were cited in Section 5) Discussion and Analysis, pseudonyms were used instead of their real names.

All collected data is stored on my working PC. My encrypted laptop is solely for research and academic purposes.

#### 4.4. Data Collection and Analysis

##### 4.4.1. Data Collection

An invitation link was sent to all participants to access pre-interview surveys on 24/02/2025. All the participants completed the surveys by 15/03/2025. Among the 16 participants who completed the surveys, 8 participated in follow-up interviews from 17/03/2025 to 18/03/2025.

The online interviews were recorded and conducted in Chinese; afterwards, non-verbatim translations were made for all transcripts. Then, I identified the themes most relevant to my analysis of Hong Kong undergraduate students' use of generative AI on the transcripts and taxonomized them into a thematic codebook (Appendix D).

##### 4.4.2. Data Analysis

For the data analysis procedure, a codebook was developed for the current study based on Higgs and Stornaiuolo (2024) approach for organizing the codebook (Appendix D).

In the translated transcripts, the content/themes (i.e., subcodes in the codebook) were highlighted related to 1) reasons and ways Hong Kong undergraduate students engage in their studies, 2) their reflections and considerations on AI-generated writing, and 3) critical (e.g., ethical) considerations on DeepSeek. They were then taxonomized into a codebook comprising three major headings (topic codes): 1) Using DeepSeek in studies; 2) DeepSeek (AI) writing considerations; and 3) Critical reflections and perspectives on DeepSeek. The highlighted content and themes (with definitions) within each of the three major sections were aligned. Higgs and Stornaiuolo (2024) adopted a similar way of organizing the codebook.

## 5. DISCUSSION AND ANALYSIS

### 5.1. Ways And Reasons Students Deploy Deepseek in Their Studies

#### 5.1.1. Academic Reading and Writing

Reading and writing are interconnected, and it is essential for students to scrutinise monographs and journal articles and look for relevant literature as they develop their essays. From daily observation, most university lecturers require students to include literature reviews in their essays. Students must summarise insights and look for research gaps from previous literature. That is the reason why the two activities, reading and writing, were combined into the same section for analysing the impact of DeepSeek on these activities.

In the first category of *AI-technobiography* (Appendix C), All (N=6) students reported using DeepSeek to help with summarizing journal articles and facilitating essay writing, and they shared their reasons for doing so. As Student F, a sociology major, shared:

*"Sociology is a reading-heavy humanities major, and we have to review lots of previous literature before writing essays. It is a tiresome process we have to first search for relevant literature on journal databases, and it takes me 1 week to do so without the aid of generative AI. After identifying relevant literature, I have to summarize 400 to 500 pages of papers and monographs and highlight the key themes before writing the papers. Without the aid of AI, it may take up to 2 weeks for me to scrutinize every paper and highlight the details. Our professors require us to write 3000 words for*

*each paper, and I may need another 2 weeks to complete the essay. With so many deadlines, I have no choice but to leave the task of relevant literature identification and summarization to AI. Simply by pasting long articles into DeepSeek and clicking a button to generate a summary, I may save unnecessary time to read and spare more time to think and write my papers after all, my final grades depend on the paper, and the professor won't care how many articles students read or how deeply students scrutinize the literature. I even looked for YouTube tutorials for the best strategies to utilize AI for instance, what kinds of commands I should type to the AI chatbot to get the most precise and accurate results."*  
(Student F, unabridged version of [Appendix D 3.2](#)).

Simply by reviewing this excerpt, one may hastily conclude these students as 'advanced users of technology (AI)' - students learned (or with a pejorative expression, they 'aspire to exploit') AI as they wanted to improve study efficiency and get better grades. Student F watched YouTube tutorials and learned the most effective way of deploying AI in their studies (i.e., they want to be advanced users of AI) as he knew that doing so would increase his study efficiency. As the interview continued, it was evident that these students were not merely deploying AI as means for ends such as academic success. They were highly sensitive to the authenticity of the content generated by AI and reflected on the ethical considerations when deploying AI.

All interviewees (N=6) in the study had experience asking DeepSeek chatbots for definitions of technical jargon. As Student F continued:

*"As I have mentioned just now, my classmates and I would ask DeepSeek for the definitions of some technical jargon. While sometimes the definitions may be accurate, occasionally the chatbots may generate incorrect definitions or simply mix up definitions with other sociology concepts. For sociology readings, we must incorporate the context of the readings into our interpretation. For instance, merely inserting 'discourse' into the chatbot may generate various interpretations of discourse some more sociologically inclined, others more linguistically inclined. If we do not cross-compare the generated results with the original readings and select the definition of 'discourse' that is seemingly relevant to my current papers, we will be in great trouble. I always remind myself that AI is merely an aid to my studies and should not replace the original text. I believe it is beneficial for students to juxtapose various definitions within the context of the readings and determine which ones most align with the original intent of the author. Occasionally, DeepSeek makes mistakes regarding the proposer of a theory. In the past, I remember the AI stating that Max Weber proposed a theory which was actually advocated by Émile Durkheim. My instincts told me that there must be some mistakes. I immediately consulted my sociological textbook for clarification AI can sometimes be wrong! This reminds me to authenticate the generated content and never blindly follow AI's suggestions. It would be embarrassing to deploy a misinterpreted or totally irrelevant theory when I write my essays!"*  
(Student F, unabridged version of [Appendix D 3.1](#)).

It is evident that Student F would not merely follow generated content on the AI chatbot - they would cross-reference it with the original to ensure they correctly interpreted the concepts. Other interviewees shared similar experiences. In the interviews, Student B, D, and E, majoring in social science-/ humanities-related disciplines (majors that require significant reading), and who had experience reviewing copious literature, also indicated that they would search for the definitions of concepts in DeepSeek, and they often actively reflected on the definitions of technical jargon generated in the chatbots. From this example, we can see that while these students were not philosophizing on the ethical aspects of AI, the example demonstrates that these students were actively reflecting on the content generated by AI. They realized that content generated from DeepSeek might be flawed or incomplete and developed a habit of verification by cross-referencing credible academic sources. Despite the popularity and accessibility of generative AI, students remained highly sensitive to the potential flaws of AI.

### 5.1.2. Writing 'Essays' / Codes with Formal Language

As stated in Section 4.1 and 4.2, students with non-humanities/social sciences majors were deliberately invited to participate in the study to explore potential differences in how they and humanities majors deployed AI. Among

the five participants who completed the survey, three participated in the interviews and shared their thoughts on DeepSeek. For instance, Student C, a first-year student in mechanical engineering, shared:

*"Unlike humanities students, we seldom write essays and term papers. Instead, we devote lots of time in coding - with DeepSeek, I can generate general code structures that serve various purposes. It saves a lot of time, and I can develop my original codes based on the framework generated by AI. However, I would not hastily copy and paste the generated code and submit it to my professors. I will always edit the generated code ... It is always necessary to have human oversight to observe 'bugs' and logical errors in the code. According to my previous experiences, there are certain minor flaws in every piece of code. It is crucial to accompany AI with manual reviews."*

*(From student C, unabridged version of Appendix D 3.3).*

At first glance, writing codes and essays radically differ, and it does not qualify as a literacy event. Both writing essays and coding may be considered as language practices, albeit the former is natural language writing, and the latter is formal language writing. During previous encounters with STEM majors, they analogized coding with essay writing. Investigating Hong Kong undergraduates' formal language writing practices and their relationship with AI is equally important.

Like interviewees from humanities major backgrounds, we can tell that Student C (who majors in STEM discipline) actively deployed AI in his "essay" (code) writing as he thought that doing so was beneficial to his studies, and he might eventually get a higher grade. However, he revealed that he would not insensibly deploy the code in his studies, always "look for bugs" and "scrutinize logical errors" from the AI-generated code. It is reasonable to conclude that both Student C (STEM major) and Student E (humanities major) in Section 5.1.1 actively reflect on their literacy practices and they are not merely "advanced users of AI", but "actual philosophers" who are capable of critically reflecting on the ethical implications of AI (see my explanations below and in section 5.2).

As Student C continued:

*"As a mechanical engineering major, I need not delve into the nature of algorithms just like my peers majoring in information systems engineering. However, my colleagues from the information technology department described the logic behind most algorithm designs as a loop. When users input biased data into the feedback loop, it may perpetuate biased results. For instance, my friends told me that generative AI may reinforce systematic racism. For instance, I attended an elective course last semester about criminology and searched for the crime rates of specific regions in the US in DeepSeek. I was surprised to find out that DeepSeek highlighted the fact that people of color have a higher level of arrest rates in those regions. I didn't ask for the ratio of the arrest rate- I just inquired about the overall crime rate in those regions. Why did the AI put emphasis on the ratio? The ratio connotes that coloured people are more likely to be involved in crime. To me, it has something to do with the algorithms. It incorporated discriminated data into the AI model."*

*(From student C, unabridged version of Appendix D 3.7).*

From this example, it is evident that Student C, a STEM major, is an active philosopher of AI who has reflected on the content generated by DeepSeek. He concluded that the generated content might insinuate racism (creating a wrong impression that black people were more likely to be involved in crimes and reinforce systemic racial biases). It is evident that Student C was able to reflect on the racial-ethical impacts of generative AI.

In Section 2.1.2, it is speculated whether students use DeepSeek differently, as Tajik and Tajik (2023) reported on ChatGPT. Based on the discussion above, it is reasonable to assume that students utilize both generative AI platforms for similar purposes such as facilitating learning, including searching for definitions of vague concepts.

## 5.2. Impacts of DeepSeek on Students' Studies

In Category 3 of the *AI-technobiography* "transitions in the era of AI", all interviewees indicated that the virality of generative AI significantly impacted students' essay writing process - namely, DeepSeek can generate whole sections (e.g., abstract and introduction) of academic essays. It substantially contrasts with the days when generative

AI had not become popular and when students had to complete whole essays manually. They noticed that some of their peers radically changed their academic practice (i.e., copying and pasting generative AI content into their essays). Owing to space constraints, I here selectively quote student A's sharing as his sharing was the most detailed among the interviewees. Student A shared:

*"I had experiences writing a 5000-word essay when I was in secondary school. The format of the essay is highly similar to university research papers that comprise introduction, literature review, research questions, methodologies, and discussions. I did that essay in 2016 when AI was not popular, and we had to write every section of the paper in our own words. Nowadays, some of my schoolmates request DeepSeek to write an introduction for their term paper, adjust a few wordings, and directly paste it into their paper. They tell me that the AI detector would not find anything suspicious if they replace certain words with synonyms and rearrange sentence orders. They even suggest I follow their unethical academic practices. It is a blatant violation of academic integrity and of course I do not follow them. At that moment, I lamented: academic practices have radically changed within a decade it no longer takes hours to write my essays, and it is so enticing to exploit AI in my studies. To me, it is common sense to write one's assignment before AI became popular, I would not request my classmates to complete my assignments likewise, I would not request AI to write my essays. After all, it is our responsibility to write our essays. The emergence of new technologies assists our studies, not overtaking our responsibilities to complete our own essays."*

*"I also reflect on the styles and AI-generated writings, which at first sight are so similar to human writings. Content generated by DeepSeek lacks the personality and spontaneity that make human writing engaging. The sentences are fragmented and sometimes overrun. They are so different from human writings. Writers with blood and flesh would never write in such naturalistic styles. In the future, as AI algorithms advance, I expect AI-generated writings to be increasingly human-sounding, and all those sentences may eventually disappear. However, I will insist on writing my own essays no matter how advanced the AI models become it's just unethical."*

*(From Student A, unabridged version of Appendix D 3.4).*

From the above excerpt, Student A compared how he did his essays before and after the widespread use of AI in studies. He juxtaposed the days when he and his peers had to write every section of the paper themselves with nowadays, when AI-generated writing is comparable to human writing, and some of his peers failed to resist the temptation to plagiarise and uphold academic integrity. He explicitly stated, "... (students) *shall not ask AI to complete any paper sections*". However, he also emphasized that *"I would only request DeepSeek to clarify obscure academic notions"* for himself, demonstrating that he was not an "AI Luddite"<sup>6</sup> who strictly resisted deploying AI into his studies and failed to appreciate the benefits and opportunities of deploying AI.

Besides reflecting his own essay writing practices under the impact of AI, he also actively observed and philosophized (criticized) on his peers' unethical use of AI and believed that directly copying AI-generated content into one's writing is *"a blatant violation of academic integrity"* and abstained from emulating his peers. It is evident that Student A critically reflects on the concerns of academic integrity (a crucial ethical consideration) while deploying AI.

From my perspective, the emergence of AI has posed significant impacts on most students' writing practices. Student A and his peers are not the only students who face the temptation of imputing their essay writing responsibilities. While AI impacts students' writing practices, some students uphold academic ethics (e.g., Student A) as they did before generative AI hit mainstream (because they think they ought to) and use AI sensibly. Others succumb to the temptation and incorporate copious generated text from AI chatbots. Owing to a small study sample, this paper may not hastily conclude that all undergraduate students have already become *"philosophers of technology (AI)"* who are capable of critically reflecting on AI; however, it is reasonable to categorize these students as *"active philosophers"*.

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<sup>6</sup> Luddite: One who is opposed to especially technological change (Merriam-Webster, 2025).

All students revealed that they noticed the features of the writing generated by DeepSeek some sentences are fragmented with strange syntax and are highly dissimilar to writings by real humans. Unfortunately, it is out of the scope of this study to obtain actual generative AI writing samples and analyze the characteristics (e.g., syntactic structures, grammar, stylistics of those writings). The present study attempted to ask follow-up questions and encouraged these students to provide concrete examples and details of these fragmented sentences. However, they contemplated for a while and admitted to forgetting the details.

### 5.3. Reflection and Further Advancing “Philosophers of Technology”

After confirming these students as philosophers of AI, the present study would like to further develop Vakil & McKinney’s (2022) insights.

The emergence of online databases stimulates stakeholders (e.g., ethical scholars and policymakers) to reflect critically on the implications of e-databases for reading and writing. They subsequently formulated database use guidelines to safeguard intellectual property. However, policymakers and educational ethics scholars should not be the only people responsible for reflecting on technology implications and developing policies for technology use. From my perspective, social sciences and humanities majors may collaborate with professional educational ethic scholars and policymakers to philosophize on the ethical considerations of any technologies, exchange their insights, and translate philosophical reflections into actual ethical guidelines/policies regarding the use of e-database, generative AI, or any technology in the future that has excellent potential to deploy in an academic setting. Senior officials (e.g., chancellors/provosts) of tertiary institutions may consider incorporating insights of these “*philosophers-practitioners*” as they formulate or amend guidelines/policies for responsible and ethical use of AI in studies.

Students majoring in humanities are not the only individuals who may apply philosophies into practice. As shown in Section 5.1.2, Student C, majoring in STEM disciplines, did not merely deploy AI to write the structure of computer codes to increase their efficiency of studies (which is analogous to humanities majors writing term papers). Instead, he actively philosophizes on technology. He expressed concerns about AI’s potential to perpetuate racial biases and injustice. STEM students can utilize their technological expertise to improve algorithmic transparency, enhance the capability of detecting and removing biased data in algorithms, and mitigate potential biases. Grounded in their philosophical reflections, it is believed that STEM students and youths can improve existing AI algorithms and models to address ethical concerns. This exemplifies the translation of philosophical reflections into technological advances that promote responsible and ethical use of AI in studies.

While all participants of this study are qualified as “*philosophers of technology*”, it is unfortunate that they have not yet further advanced their philosophical reflections into actual practical actions. In fact, students/youth from all academic disciplines may possess dual identities as both “youth and *skilled producers of policy/technology*” (similar to the second philosophical camp introduced in Vakil and McKinney (2022) and “*philosophers of technology*”. From my perspective, students/youth shall advance from merely philosophizing to emphasizing philosophy and practice equally. This paper would like to advocate a new category: “*youth/students as philosopher-practitioners*” to describe youth who successfully integrate philosophical reflections into technological/policy-level improvements that help mitigate ethical issues and advance racial/social justice. In the future, institutions shall not only encourage students to actively reflect/ philosophize on the ethical implications of AI but also cultivate them to become “*philosopher-practitioners*” who can utilize their professional knowledge to mitigate ethical concerns and advance social (including racial) justice.

### 5.4. From Technobiography to AI-Technobiography

As stated in the research objectives, this study is a pilot study to deploy a modified *technobiography* into future AI-mediated literacy studies. This section responds to this objective.

Lee and Barton's (2013) *technobiography* is an ethnographic method for eliciting data on the online literacy practices of different communities/ethnographic groups online. Similarly, AI-mediated literacy research can adopt an ethnographic focus, and if the researcher adopts such a focus, they may consider deploying AI-technobiography.

Lee and Barton (2013) suggested that researchers amend the original *techno-biography* where necessary to suit tailored research needs. This study shows that by omitting and amending specific categories from the original *techno-biography*, researchers may deploy *AI-technobiography* into AI literacy studies. The modified model is named *AI-technobiography* to emphasize that this model focuses on eliciting qualitative data regarding AI-mediated literacy practices.

Similarly, the *AI-technobiography* itself can also be modified to suit various research needs, just like Barton and Lee's *techno-biography*. In Appendix C, DeepSeek has been mentioned in different categories of *AI-technobiography*. Still, researchers can freely replace the AI model to suit their research needs. For instance, researchers may use the same method to analyze AI-mediated literacy practices on ChatGPT-4/Google Gemini instead of DeepSeek.

Moreover, this model is not limited to investigating AI literacy practices of a particular ethnographic group (i.e., researchers can deploy the method to elicit data from groups other than undergraduate students from a specific region). It is also possible to investigate current teachers<sup>7</sup> use of a particular AI model in their teaching - all they need to amend is specific wordings on the categories. For example, if the intended study population is English language teachers, Category 2) 'Life history of using generative AI in studies' can be amended to 'Life history of using generative AI in daily English teaching.' Category 4) 'Studies in the age of AI' can be modified to 'Teaching English in the age of AI.' Another example is deploying the method to investigate the AI-literacy practices of people who often read and write as part of their duties (e.g., white-collar workers). Researchers in the future may deploy the method to investigate their AI-mediated literacy practices.

## 6. CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

The question of how and why these students deploy DeepSeek in their studies is investigated in this study. Furthermore, the impacts of DeepSeek on studies and written literacy are discussed. Moreover, the informants in this paper have been confirmed as "philosophers of technology" as they have actively reflected on AI-mediated writing and shown ethical concerns about the use of AI. Then, the present study attempted to further develop the theoretical framework of Vakil and McKinney (2022) and advocated *youth/students as philosophers-practitioners*. Lastly, this paper has demonstrated the feasibility of modifying Lee and Barton's (2013) *technobiography* into AI-mediated literacy studies.

One limitation of this study is the small number of participants. Due to time constraints, only six students have been invited to participate in the research. This may not be a representative number to prove that Hong Kong students are generally "*philosophers of technology*". Some students may neglect the ethics of deploying AI in their studies or even deliberately exploit DeepSeek in their studies.

As mentioned in section 5.2, all students revealed that they noticed distinct patterns in the syntax, vocabulary, or style of the writing generated by DeepSeek. However, this research does not require participants to provide generative AI writing samples for further analysis of those writings' syntactical patterns and literacy styles. Other than merely deploying qualitative ethnographic methods, future research may consider incorporating actual AI-generated writing examples into the analysis.

These students mainly reported the impacts of DeepSeek on reading and writing (written literacy practices). However, DeepSeek assists studies beyond facilitating reading and writing. For instance, in the future, scholars can investigate how students use AI for quantitative data analysis and image generation. Further research can be

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<sup>7</sup> It can also be teachers of a specific subject, e.g., English Language or people from various sectors and occupations.

conducted to explore other critical perspectives and considerations/reflections on AI as they deploy AI for other purposes (e.g., conducting quantitative data analysis and generating images).

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**Transparency:** The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

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**Appendix A.** Pre-interview survey.

Appendix A shows questions in the pre-interview survey.

1. Sex:

- Male
- Female

2. Age:

3. Year of Studies

- First Year
- Second Year
- Third Year
- Fourth Year/ Final Year
- Fifth year or above

4. What is your major in university? [short text answer]

5. Have you used DeepSeek in your studies?

- Yes
- No

6. If you use or have tried DeepSeek in your studies, what do/did you use it for? Check the box(es) below that apply:

- Assisting essay/Report/Term paper writing.
- Summarizing journal articles.
- Grammar and spell check your writings.
- Asking definitions and example of technical terms.
- Others (Short answer text).

**Appendix B** illustrates the original technolinguistic biography developed by Lee and Barton (2013).

Category 1) Current practices: What are the sites you use most often, and which ones have you contributed to?

Category 2) Participation: Have you commented on news or products? Voted on the quality of service? Submitted a review or a wiki entry? Uploaded pictures or videos for comment?

Category 3) A day in the life: Think of yesterday, what technologies did you first deal with when you woke up? How did it continue during the day?

Category 4) Life history: When did you first use a mouse? Send a text message? Search Wikipedia? Start using Facebook?

Category 5) Transitions: Did you change your practices of keeping people's addresses, arranging to meet friends, using maps, etc.?

Category 6) Domains of life: Are there differences in your everyday life, your student life, and in any work life? Other domains, such as religion, sports, politics.

Cross-generational comparisons: Differences across generations, including parents, grandparents, and children; differences across cultures, such as friends from other countries; gender differences and prohibitions.

Appendix C shows the guiding questions for the AI-technobiography of Hong Kong undergraduates (in interview questions format).

Category 1) Current practices of AI:

- How do you deploy generative AI (DeepSeek) in your studies? (I will invite them to further explain the details according to the boxes they selected in question 6. For instance, if they selected 'assist term paper writing,' what does it actually mean by assist? Do they directly copy and paste some or whole sections of AI-generated writing?)
- What are the issues related to writing with DeepSeek (or AI in general) that you think people need to consider?
- Do you think there should be any ethical considerations, if any, as you deploy DeepSeek in your studies?

Category 2) Life history of using generative AI in studies:

- When did you first access an AI platform?
- When did you first deploy DeepSeek in your studies?
- What made you start deploying AI in your studies?

Category 3) Transitions in the era of AI:

- Compared to the days before generative AI became viral, is there a difference in your academic practices? For instance, does it affect your academic writing practices? The way you do your readings? Since late 2022, when free generative AI models (e.g., ChatGPT and DeepSeek) went viral publicly, how has it affected your studies?

Category 4) Studies in the age of AI:

- How is your study and academic practices affected by the sudden viral of generative AI?
- How are your studies/academic practices affected by generative AI, particularly by DeepSeek?

Appendix D shows the codebook (The organization of the codebook to is inspired from the table on (Higgs & Stornaiuolo, 2024).

1. Topic code	2. Subcode and definitions	3. Data examples
1.1 AI use in studies	2.1 Clarifying: Checking the definition of jargons/ Academic notions in their readings.	3.1 "...While sometimes the definition may be accurate, occasionally the chatbots may generate incorrect definitions, or they simply mix up the definitions with other sociology concepts..."
	2.2 Summarizing: Summarizing course readings.	3.2 "...I have to summarize 400 to 500 pages of papers and monographs and highlight the key themes before writing the papers. Without the aid of AI, it may take up to 2 weeks for me to scrutinize every paper and highlight the details..."
	2.3 Writing: Generating the framework for the essays (humanities and social sciences students)/ coding (STEM students).	3.3 "...I can develop other codes based on the framework generated by AI..."
1.2 AI writing considerations	2.4 Stylistics differences: Students mentioned about the difference of writings generated by AI and humans	3.4 "...content generated by DeepSeek lacks the personality and spontaneity that make human writing engaging... The sentences are fragmented and sometimes overrun..."
	2.5 Authenticity: Some students requested AI to generate sections of writings and copied and pasted them to their own work.	3.5 "...Nowadays, some of my schoolmates requested DeepSeek to write an introduction for his term paper, adjusted a few wordings and directly pasted it to his paper..."
1.3 Critical reflections	2.6 Academic Integrity: Students	3.6 "...some of my schoolmates requested

1. Topic code	2. Subcode and definitions	3. Data examples
on DeepSeek	mentioned that it is tempting to deploy AI and reminded themselves to avoid unethical use of AI.	DeepSeek to write an introduction for his term paper, adjusted a few wordings and directly pasted it into his paper... After all, it is our responsibility to write our essays. The emergence of new technologies assists our studies, not overtaking our responsibilities to complete our own essays.”
	2.7 Bias perpetuation: AI generates results that perpetuate social (Racial) injustice.	DeepSeek highlighted the fact that people of color have a higher level of arrest rates in those regions. I didn't ask for the ratio of the arrest rate I just inquired about the overall crime rate in those regions. Why did the AI put emphasis on the ratio?

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