

## **Developing Guidelines for the Use of Generative AI in Education and Research-Toward Acceptance of Ethical Behavior by Students**

Nagayuki Saito, Sendai University, Japan  
Chiaki Hashimoto, Sendai University, Japan

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### **Abstract**

The advent of generative artificial intelligence (AI) has created confusion in education and research. Generative AI will force a review of lesson design in educational settings, and the future of education will necessarily include dramatic changes. Accordingly, many educational institutions have begun formulating operational policies for generative AI in educational and research activities. To address these newly emerging issues, Sendai University formulated guidelines for students and faculty to indicate policies for using generative AI in education and research. These guidelines provide operational policies regarding events that may occur when using generative AI. If the text output by AI is copied and parsed as a report or paper, it may be considered plagiarism. Report assignments are intended to develop the ability to understand and generate objective and logical texts; however, the use of AI must not impede the development of that ability. It is necessary to confirm whether the information output from AI is correct, and when confirming information, it is necessary to do so based on multiple information sources. Care must be taken not to input personal information, private information, or confidential information into AI systems. This study examines the degree of student acceptance of these guidelines.

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## **1. Introduction**

### **1.1 The Social Context Surrounding Generative AI**

The emergence of generative AI, such as ChatGPT, Stable Diffusion XL, and Bard, may have brought about a major social turning point, requiring fundamental rethinking of the concept of creative activity, including the processes involved in human creative activity, attribution of created works, and handling of data required for creation. This means that it is necessary to design an architecture that will allow people to continue to be the main actors in economic, social, educational and research activities in the future.

Generative AI has high potential, and its capabilities continue to evolve on a daily basis. For example, ChatGPT-4 has been reported to produce passing-level answers to all US Certified Public Accountant (CPA), Certified Management Accountant (CMA), Certified Internal Auditor (CIA) and Certified Tax Accountant (EA) exams (Jolly, 2023).

Although generative AI can produce highly accurate answers to standardized knowledge-based examinations, it cannot provide accurate answers to non-standardized questions at present. This is because such AI only generates and outputs a certain level of “plausible sentences” based on probability theory from a vast amount of data collected by large-scale language models (LLMs).

Additionally, it has been indicated that if there is bias in the data used for learning, the resulting output may also be biased (Angwin, Larson, Mattu & Kirchner, 2016). Critical thinking is required to make appropriate judgements regarding the biases produced by such learning algorithms.

Furthermore, great care must be taken with the input of personal and sensitive information; although it is stated that no user-specific data are stored in ChatGPT, all conversations between ChatGPT and the user are stored, and these data could be used to improve the language model (OpenAI, 2023). If personal or sensitive information is entered, the risk of such sensitive information being viewed by the development engineers of generative AI cannot be excluded.

As of August 2023, the number of unique users of ChatGPT is reported to be 180.5 million (Tong, 2023). The global AI market value is expected to reach approximately USD 2 trillion by 2030, compared with approximately USD 208 billion in 2023 (Thormundsson, 2023). Thus, despite the expanding market, social institutions related to AI have not been sufficiently responsive to the need to address the associated issues, although the need for such initiatives has been identified.

### **1.2 Trends in the Field of Education and Research Into Generative AI**

Generative AI has caused confusion in education and research. Generative AI will force a review of lesson design in the field of education and will dramatically change the nature of education in the future. Accordingly, many educational institutions have begun to formulate policies for the use of generative AI in education and research activities.

Regarding international university initiatives, the Center for Computing & Data Sciences at the University of Boston requires that credit be given for any use of generative AI, as well as an appendix detailing the entire interaction with the AI and explaining why it was used

(Welker, 2023). Monash University requires students to be briefed on its policy for the assessment of reports produced using generative AI to support responsible and ethical use of generative AI, and to strictly control any conduct that constitutes academic dishonesty (Monash University, 2023). In addition, Southern California University recommends the exploratory use of AI, subject to adequate consideration of research ethics in accordance with the guidelines set by the university (University of Southern California, 2023). In Japan, the Ministry of Education, Culture, Sports, Science, and Technology has begun compiling reference materials for handling generative AI in schools (Ministry of Education, Culture, Sports, Science and Technology, Special Committee on Digital Learning Infrastructure, 2023).

## 2. Development of the Generative AI Operating Rules for Students

### 2.1. Methods of Validation

Given these pressing educational issues, Sendai University formulated guidelines in July 2023 to indicate the rules of use for students when using generative AI in their learning and research activities; they made the guidelines available not only to students but also to the general public. An overview of Sendai University's guidelines is provided below ("Content of the Guidelines for the Use of Generative AI by Sendai University"):

- 1) *You must not copy the text output by the AI directly into reports, papers, etc. Some assignments may be regarded as plagiarism, which is a form of cheating.*
- 2) *You must submit your own work for report assignments and dissertations; AI-generated texts cannot be considered your work.*
- 3) *Universities are places of learning where students develop the ability to comprehend and produce objective and logical texts, and the use of AI should not inhibit your thinking.*
- 4) *Always check the information output from the AI to ensure that it is correct. It is recommended that information is verified from multiple sources.*
- 5) *Take care not to enter personal, private, and confidential information into the AI.*

Based on Sendai University's Guidelines for the Use of Generative AI, this study evaluated whether students have the knowledge and attitudes required to effectively use generative AI and appropriately deal with problems such as fraud, information leakage, and generated misinformation. Specifically, a questionnaire was administered to the students to answer the following research questions:

- 1) What kind of generative AI do students use and to what extent do they use it?
- 2) Are there gender differences in its use?
- 3) Do students use generative AI after reading the Sendai University guidelines?
- 4) For what learning purposes are they using generative AI?
- 5) Do they try to not input personal, private, or confidential information when using generative AI?
- 6) Do they use opt-out settings to prevent the data they input from being used for machine learning by the AI?

By asking these questions, it is possible to assess students' level of commitment to the appropriate use of generative AI in learning and research activities. If they are not fully committed to any of these issues, measures could be taken to address them, which would help ensure the credibility of student learning and research.

### 3. Survey Methodology

In this study, students affiliated with Sendai University were surveyed using a questionnaire to determine trends in the use of generative AI and students' attitudes toward the Guidelines for the Use of Generative AI. The questionnaire was administered between December 12 to 22, 2023. It was completed using Google Forms via Sendai University's learning portal. Participants were first- to fourth-year students at Sendai University. A total of 152 participants responded to the survey, of whom 149 provided valid responses. Answers were provided to 33 questions using a 7-point Likert scale, with free-text, single-choice, and multiple-choice methods interwoven, as appropriate. This survey was conducted in accordance with the ethical code of Sendai University; no personal information of the participants was collected, and no questions that imposed on the individual's privacy were asked.

Item	Contents
Purpose of the survey	Determine trends in the use of generative AI and attitudes towards the Sendai University Guidelines
Period of implementation	12–22 December 2023
Survey method	Web-based questionnaire using Google Forms
Participants	First- to fourth-year Sendai University students Number of responses: 152 Valid responses: 149
Answer format	7-point Likert scale, free-text, single-choice, multiple-choice
Number of questions	33

Table 1: Summary of Survey Implementation

### 4. Analysis of Questionnaire Data

#### 4.1. Experience of Using Generative AI and Whether the Guidance was Read

The students were asked whether they had read the guidelines on the use of generative AI. Of the participants, 71.81% had not yet read the guidelines. When asked about their experience of using generative AI, 29.53% of the students had used it, while 70.47% of the students had not yet used it.

	Answer	Count	(%)
Gender	Male	98	65.77
	Female	49	32.89
	No answer	2	1.34
Read guidelines	Haven't read it	107	71.81
	Read it	42	28.19
Experience of use	Never used	105	70.47
	Have ever used	44	29.53

n = 149

Table 2: Gender of Participants and their Experience of Using Generative AI and whether they had Read the Guidance

An analysis was conducted to determine whether there were gender differences in the use of the generated AI. There were 98 (65.77%) male students, 49 (32.89%) female students, and 2 students who did not respond. A Mann-Whitney U test revealed that female students were significantly more likely to use generative AI, with female students averaging 1.62 times per week of use and male students 1 time per week ( $p < 0.01$ ).

	count	mean	std	median	p-value
Female	13	1.61538	1.043908	1	0.0015
Male	31	1	0	1	

n=44

Table 3: Frequency of use of Generative AI by Gender

Particular consideration needs to be given to whether students using generative AI are doing so in accordance with the university’s guidelines for its use; these results could be used to determine future policies for teaching and raising awareness. Therefore, we analyzed the relationship between whether students had read the university’s usage guidelines and their experience using generative AI. The results showed that 40.91% of the students who had experience using generative AI said that they had read the guidelines, whereas 59.09% said they had not. A chi-square test indicated the difference was significant ( $\chi^2(1) = 4.14, p = 0.0419$ ). This result indicates that approximately 60% of students who use generative AI do so without following the university’s guidelines. The percentage of students who had never read the guidelines was high (77.14%) among those who had never used generative AI; therefore, it is necessary to take measures to address this lack of knowledge. However, it is also necessary to provide guidance and awareness-raising activities for students who have not read the guidelines despite using generative AI.

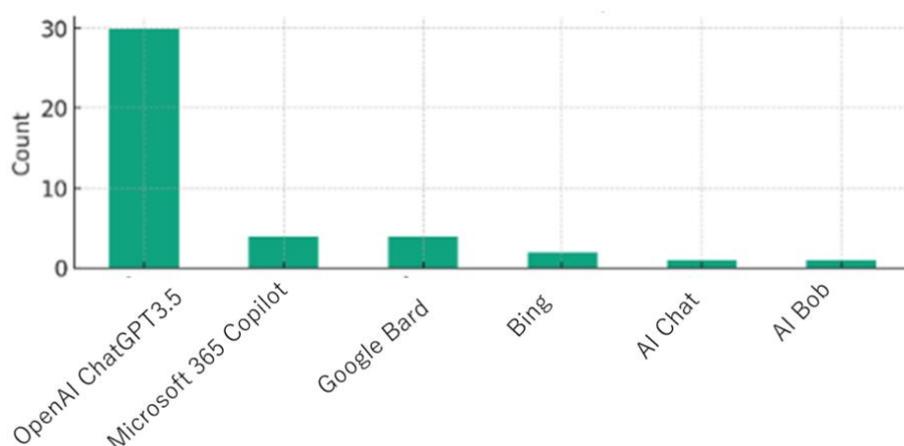
		Read guidelines				
		Total	Haven't read it		Read it	
			Count	(%)	Count	(%)
Experience of use	Never used	105	81	77.14	24	22.86
	Have ever used	44	26	59.09	18	40.91

n=149

Table 4: Use of Generative AI and Whether the Guidelines were Read

#### 4.2. Type of Generative AI Used and Intended Use

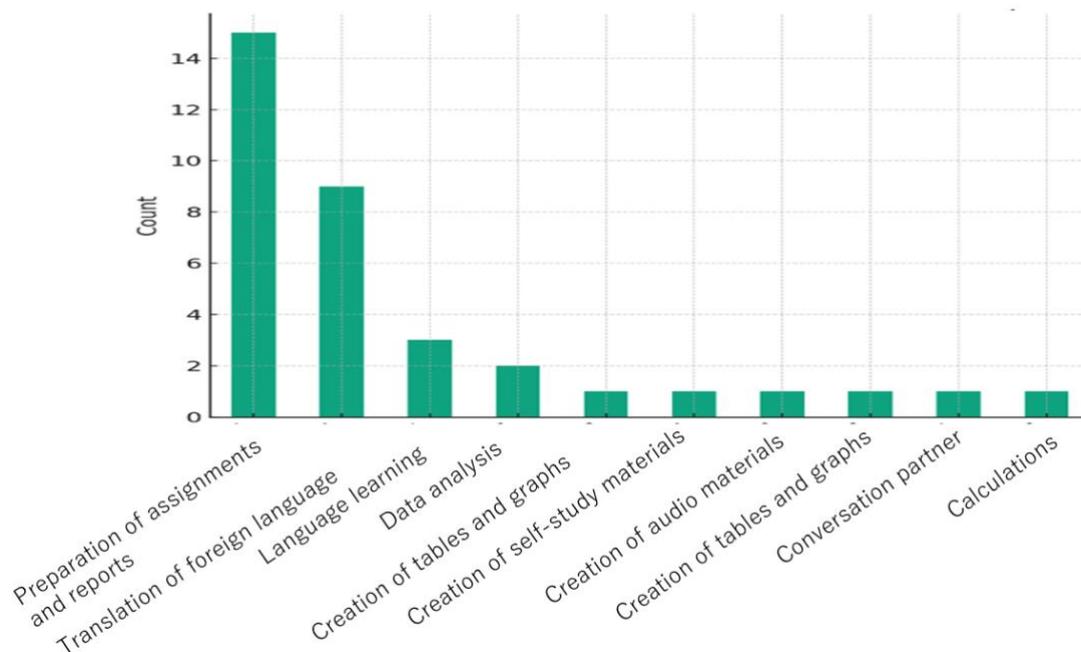
Students with experience in using generative AI were asked a series of questions relating to the AI they used. The results showed that the most common system was OpenAI's ChatGPT-3.5, which is available free of charge. This was followed by Microsoft 365 Copilot, which is bundled with Microsoft Office, and Google's Bard, but they received only a tenth of the number of responses for ChatGPT-3.5. There were no reports of the use of image-generation AI such as Stable Diffusion XL, although this may be related to the nature of the physical education university.



N = 149

Figure 1: Types of Generative AI Used

Next, the students were asked about their use of AI. The largest number of respondents used AI to prepare class assignments and reports, followed by translation of foreign language documents and language learning.



N = 149

Figure 2: Description of Uses of Generative AI

Students with experience in using generative AI were asked whether they had used generative AI to prepare assignments and reports at university. The results showed that 34.09% of the students used generative AI to write assignments and reports. Furthermore, 4.55% of students reported that they copied text output using generative AI when preparing assignments and reports. This is clearly cheating and requires guidance and awareness to prevent such behavior. Furthermore, teachers should be required to submit assignments and reports that cannot be answered by AI, to prevent such acts.

Next, the students were asked whether the results output by the generative AI were correct and whether they checked the facts. The results showed that 75% of the students fact-checked the results, while 25% neglected to do so.

Students were then asked whether they had ever entered personal, private, or confidential information when using generative AI. The results showed that 13.64% of students stated that they had entered personal information. To a lesser extent, 6.82% of students had entered privacy information and 2.27% had entered confidential information.

	Answer	Count	(%)
Experience of use for reports	Not used	29	65.91
	Used	15	34.09
Copying Experience	Copied	42	95.45
	Not copied	2	4.55
	Not checked	11	25
Checking facts	Checked	33	75
Entering personal data	Not Entered	38	86.36
	Entered	6	13.64
Entering privacy data	Not Entered	41	93.18
	Entered	3	6.82
Entering confidential data	Not Entered	43	97.73
	Entered	1	2.27

n=44

Table 5: Use of Generative AI for Learning and Input of Personal Data and Other Information

Personal, private, and confidential information is not only information related to individual students, but also information about other students and the university; therefore, it is necessary to instruct and raise awareness among students not to enter such information. As a measure to consider information that the user does not want others to know or to make public, an opt-out setting is necessary to prevent the input data from being used for subsequent machine learning.

	Answer	Count	(%)
Knowledge of machine learning	Knew	93	62.42
	Did not know	56	37.58
Opt-out experience	Not experienced	28	63.64
	Did not know	15	34.09
	Experienced	1	2.27

N = 149

Table 6: Machine Learning and Opt-Out Setting

Therefore, students with experience in using generative AI were asked whether they knew that generative AI was machine learning of the input data. The results showed that 37.58% of the students did not know that generative AI is machine learning data. They were further asked about their awareness of opt-out settings for the machine learning of input data and whether they had ever set an opt-out setting. The results showed that only 2.27% of the students had ever set an opt-out setting; 63.64% had not and 34.09% were unaware that opt-out settings could be set by themselves.

## 5. Discussion

In addition to summarizing the results obtained from the analysis in the previous section, this section considers future student guidance and awareness-raising activities regarding the use of generative AI at universities. Approximately 60% of the students who used AI did not follow university guidelines. This means that some students may use AI in a manner that deviates from the university's policy on the use of generative AI. Therefore, there is an urgent need to provide guidance and educational activities for students who have not read these guidelines.

Data input to the generative AI is used to improve the accuracy of the AI. Furthermore, there is a risk that the data can be read by "others," namely the developers of the AI tool. If such actions are undertaken, privacy will be violated. Therefore, it is necessary to raise awareness of opt-out settings to prevent machine learning of input data, as well as to instruct and raise awareness of the actual opt-out settings.

Among the student users of generative AI, 34.09% used AI for assignments and reports. Generative AI is not a convenient assignment and reporting tool, and its use should be based on the risk that what is entered and generated as outcome will not be accurate. As such, the following question should be asked: "Why was the document generated?" The current technology for generative AI does not allow the generation of accurate documents. Currently, the technology of generative AI does not provide a self-checking function for determining whether the output is accurate. It is necessary to instruct and raise awareness regarding the use of AI with sufficient consideration of the risk of inaccuracy.

Teachers should provide assignments and reports that cannot be completed using generative AI. That is, AI may have become the catalyst for teachers to acquire the ability to conduct authentic assessments without relying on conventional assessment methods involving assignments and reports.

## 6. Conclusion

To highlight issues in the operation of generative AI in education and research at universities, this study conducted a survey and analysis of trends in the use of generative AI, awareness of usage guidelines, and attitudes and behaviors toward the appropriate use of generative AI among students. The results of the analysis indicated that only a minority of students use AI based on the university's policy for the use of AI, and that appropriate intervention is needed for such students.

Possible interventions include instructional, educational and regulatory approaches. However, regulatory approaches should be discouraged whenever possible. This is because students' free use of generative AI has the potential to encourage their independent use, leading to deeper learning and creative thinking. To enable these outcomes, they must use generative AI spontaneously and normatively. An intervention approach that makes this possible would be guiding and enlightening. Further research is required to develop effective instructional and educational measures for this purpose.

Furthermore, in university education, one of the roles of teachers has been to transfer knowledge. However, the emergence of generative AI may force faculty members to rethink this responsibility. Thus, it will be necessary to redefine the nature of education for new

university faculty members after the birth of generative AI. It is also necessary to continue examining this philosophical issue.

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