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Conference Paper

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24th Biennial Conference of the International Telecommunications Society (ITS): "New bottles for new wine: digital transformation demands new policies and strategies", Seoul, Korea, 23-26 June, 2024

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Saito, Nagayuki (2024) : The Comparative Analysis of National Policies for Research and Education Regarding Usage of Generative AI in Japan, the USA and the UK, 24th Biennial Conference of the International Telecommunications Society (ITS): "New bottles for new wine: digital transformation demands new policies and strategies", Seoul, Korea, 23-26 June, 2024, International Telecommunications Society (ITS), Calgary

This Version is available at:

<https://hdl.handle.net/10419/302516>

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The Comparative Analysis of National Policies for Research and Education Regarding Usage of Generative AI in Japan, the USA and the UK

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Abstract

Generative AI is rapidly proliferating in society and its impact extends to education and research. This study analyzes the impact of generative artificial intelligence (AI) in the field of education and research from an international perspective and compares it with Japan's educational policies. The findings revealed that the U.S. policies emphasize the personalization and adaptability of AI in education, whereas the U.K. has specified concrete measures against the negative aspects of generative AI, particularly its misuse. In contrast, the Japanese policy has adopted a strategy of delineating issues in education and research to support individual educational institutions in their policymaking regarding AI.

Keywords: Generative AI, Research and Education, Educational Policies

1. Introduction¹

1.1. Social Conditions Surrounding Generative AI

The emergence of generative AI such as ChatGPT, Stable Diffusion XL, Copilot, and Bard may have brought about a major social turning point, forcing us to fundamentally rethink our concept of creative activity, including the process of human creativity, the ownership of created works, and the handling of data required for creation. There is an emerging need to redesign our architecture to ensure that humans continue to be the main actors in economic, social, educational, and research activities.

Nevertheless, the potential of generative AI is high, and its capabilities is continuously evolving. For example, ChatGPT4 has been reported to be able to provide answers at a level that would pass all of the exams for U.S. Certified Public

Accountants (CPA), Certified Management Accountants (CMA), Certified Internal Auditors (CIA), and Certified Tax Accountants (EA) [1].

However, even though it can generate highly accurate answers to such standardized knowledge-based tests, it cannot be said that it has reached the level where it can provide accurate answers to questions that are not standardized. This is because the system only generates and outputs a certain level of “plausible sentences” based on probability theory from a vast amount of data collected by a large-scale language model (LLM). Moreover, it has been pointed out that if there is bias in the data used for training, the results output as a result of that training may also be biased [2]. As such, critical observation and analysis is needed to make appropriate judgments about the biases created by such learning algorithms.

Another major issue surrounding

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Generative AI is its potential handling of personal and sensitive information; although it is stated that no user-specific data is stored in ChatGPT, all conversation data between ChatGPT and the user are stored, which are used as references to improve the language model [3]. If personal or sensitive information is entered, the risk of such sensitive information being viewed by the engineers developing the generative AI cannot be eliminated.

The number of unique users of ChatGPT is reported to be 180.5 million as of August 2023 [4]. The global AI market is expected to reach approximately \$2 trillion by 2030, compared to approximately \$208 billion in 2023 [5]. Despite this ever-expanding market, social institutions related to AI have not yet adequately addressed the need for such initiatives.

1.2. Trends in the Field of Education and Research on Generative AI

Generative AI also has the potential to drastically affect education and research. In fact, many educational institutions have begun to formulate policies for the use of generative AI in their educational and research activities.

Looking at efforts by universities overseas, the Center for Computing & Data Sciences at Boston University requires students to give credit whenever they use a generative AI, and to include an appendix detailing the entire interaction with the AI and an explanation of why they used it [6]. Monash University requires that students be briefed on its policy for evaluating reports generated using generative AI in support of responsible and ethical use of generative AI, and that strict controls be put in place for behavior that constitutes academic dishonesty [7]. Similarly, Southern California University recommends the exploratory use of AI, provided that students follow the guidelines it has established and pay sufficient attention to research ethics [8].

Turning to trends in Japan, while there has yet to be any concrete guidelines in generative AI usage among educational institutions, the Ministry of Education, Culture, Sports, Science and

Technology (MEXT) has begun compiling materials for reference on the handling of generative AI in schools [9]. Meiji University acknowledges the potential of generative AI as a tool to support intellectual activities but points out the ethical issues involved in using it for learning and research activities [10]. Ritsumeikan University states that the users of generative AI should fully understand its characteristics and have the literacy to deal with it appropriately to promote a sound development of education and research [11]. Chuo University mentions that the users need to make judgments from an ethical viewpoint, since the risk of a generative AI system's output being influenced by hateful expressions on the Internet cannot be denied [12].

In this context, UNESCO has set forth a policy direction for a human-centered approach to education policy with respect to the use of generative AI in the education sector. That policy direction consists of seven steps: 1) approve an international or regional General Data Protection Regulation (GDPR) or develop a national GDPR; 2) approve an international or regional General Data Protection Regulation (GDPR) or develop a national GDPR; 3) establish and implement specific regulations on AI ethics (iii) establishing and enforcing specific regulations on the ethics of AI; (iv) adjusting or adapting existing copyright laws to regulate AI-generated content; (v) developing a regulatory framework for generative AI; (vi) developing capacity for the appropriate use of generative AI in education and research; and (vii) developing a to engage in a dialogue about the long-term impact of generative AI on education and research [13].

In 2021, the EU released its “Digital Education Action Plan (2021-2027),” which includes the development of ethical guidelines for the use of AI and data in teaching and learning for educators in Action Plan 6. Additionally, Action Plan 8 indicates that the European Digital Competence Framework (DigComp) will be revised to include AI and data-related skills [14].

In the UK, the Department of Education

issued a statement on generative AI in education, with the key message to educators that personal and sensitive data should be protected and that no such data should be input into generative AI. The Department asserted that educational institutions should review and enhance their cybersecurity to protect students from harmful content online, including generative AI [15].

In light of such social conditions, it is necessary to consider educational policy based on the impact of generative AI on education and research that Japan should pursue in the future.

2. Verification Methods and Subjects

2.1. Methods of Verification

This study compares and verifies educational policies in Japan with educational policies in international organizations and other countries in order to examine the use of generative AI and its impact on educational policies in Japan. Based on the results, the direction of educational policy that Japan should take are discussed. The method of comparison and verification is a content analysis of policy reports and guidelines published by UNESCO, the US and the UK, and the Japanese government.

2.2. Verified Organizations and National Policy Narratives

UNESCO (2023), a specialized agency of the United Nations dedicated to promoting educational, scientific, and cultural cooperation and exchange, has published “Technology in education: A tool on whose terms?” regarding the use of generative AI in education and research. The report examines the role of technology in education in terms of its relevance, equity, scalability, and sustainability, and how technology can provide solutions to educational challenges and improve the quality of teaching and learning, basic skills needed in everyday life, and digital skills development are considered [16].

In the United States, the Office of Educational Technology, which reports to the U.S. Department of Education and is responsible for

developing the nation’s educational policy on educational technology, published the “Artificial Intelligence and the Future of Teaching and Learning” in 2003. The report takes a positive position on the use of technology to improve teaching and learning and to support innovation throughout the educational system, noting the need to recognize and address not only anticipated risks but also difficult-to-anticipate challenges as early as possible given the expanding opportunities presented by AI [17].

In the United Kingdom, the Ministry of Education published “Generative artificial intelligence (AI) in education,” a report on the use of generative AI in education. This report provides a policy statement on the use of generative AI in education, and outlines measures against the misuse of generative AI in examinations [18][19].

In Japan, the Bureau of Elementary and Secondary Education of MEXT released “Handling of Teaching and Learning Aspects of Generative AI in Universities and Colleges of Technology” in 2023. This report points out that it is important to consider how to deal with generative AI in universities and colleges of technology in response to the actual status of education conducted at each university or college of technology. To this end, the report calls for appropriate guidelines to be provided to students and faculty members, and for responses to be reviewed as appropriate in response to technological advances and the operational status of guidelines [20].

3. Content Analysis of Policy on Education and Research in Generative AI

The policy directions of international organizations and governments toward generative AI are categorized in Table 1 in terms of policy directions, benefit factors, risk factors, and policy issues. UNESCO’s “Technology in education: A tool on whose terms?” identifies four policy directions for the use of technology, including generative AI, in education and research for member countries and associate member regions in the context of an international organization. First,

the use of technology must be appropriate to national and regional circumstances, enhance educational systems, and meet learning objectives. Second, the use of technology in education must not leave learners behind and instead make the curriculum accessible to all and prevent the

emergence of grievances in learning. Third, policies on technology must be evidence-based and set clear evaluation criteria. Fourth, the use of technology must support a sustainable educational future and should not be guided by narrow economic concerns or vested interests [16].

Table 1: Policy Directions for Generative AI by International and Governmental Organizations

	UNESCO	US	UK	Japan
Topics	International Policies	Domestic Policies	Domestic Policies	Domestic Policies
Policy Directions	Fundamental Directions for the Use of Technology in Education 1) Strengthening educational systems adapted to each country's situation, 2) Equal access to education, 3) Evidence-based educational policy making, and 4) Sustainable education.	Take educational policy initiatives specific to education to address the new educational opportunities and challenges presented by AI	Develop a policy on the use of generative AI in the education sector, based on the establishment of a task force on AI regulation	Encourage each institution to decide whether or not to use the system in accordance with its educational context
Benefit Factors	Strengthening the education system, improving learner accessibility and educational equity	AI has the potential to achieve effective education on a large scale and at low cost, enabling personalized adaptive learning	If used properly, generative AI has the potential to reduce workload in the education sector, freeing up teachers' time to focus on teaching excellence	Assistance for independent learning and support functions for education.
Risk Factors	Violation of children's rights, screen time (health), information overload, information leakage, credibility of information	Fear of causing bias or unfairness in the detection of patterns and automation of decision making	Countermeasures against abuse and cheating: use of words and vocabulary inappropriate for the respondent's level, missing citations, unreferenced references, and lack of statements related to the author.	Fraud: Possibility of unintentional plagiarism through copying and pasting Infringement of rights: risk of leakage or disclosure of confidential or personal information, infringement of rights related to existing works
Policy Issues	Evidence-based educational policy making, clear evaluation criteria, and sustainable education	Implement policies in terms of privacy protection and security, human-centered values, and responsible ethics.	Countermeasures at the institution in protecting privacy, intellectual property rights, and preventing fraud in evaluations	Fostering a sense of ethics among students through data literacy education

The next section focuses on educational policy at the national level. In “Artificial Intelligence and the Future of Teaching and Learning” in the United States, five educational directions are suggested to realize adaptive education from the viewpoint that generative AI can be a tool to personalize education. The report suggests five educational directions to realize adaptivity in education from the viewpoint that generative AI can be a tool for personalizing education. First, not only should the shortcomings of students be pointed out and improved, but also the intellectual assets of students should be discovered and developed. Second, emphasis should be placed on the essence of learning (i.e., why students learn) rather than on cognitive learning (e.g., how many things they can remember). Third, focusing on neurodiversity, in which each student has a different path to understanding, generative AI can be used as a tool to realize such learning. Fourth, generative AI can be a tool for active and creative learner-driven learning. Fifth, generative AI can function effectively as a tool for goal-oriented learning, such as learning important real-world problem-solving methods, such as persistently tackling difficult problems and seeking advice at the right time [17].

The UK, on the other hand, while acknowledging the positive impact of generative AI on education, focuses primarily on the negative aspects and has published guidance on identifying abuse that summarizes the signs of abuse when generative AI is used. The guidance identifies the following as abuses using generative AI: descriptions written using words or vocabulary that are not consistent with the respondent’s level of proficiency; writing in contexts where citations are absent but should have been noted; the respondent/author being unable to refer to references where references are given; the respondent/author being unable to relate the description to themselves; and very general content where the AI’s warnings and provisos remain in the deliverables [19].

Regarding Japanese policies, in the

“Handling of Teaching and Learning Aspects of Generative AI in Universities and Colleges of Technology,” MEXT points out that it is important to consider whether or not to allow the use of generative AI in educational activities, and to decide accordingly in that educational context. In situations where generative AI functions as an aid and support for independent learning by students, its use can be said to have a positive effect. As a guideline for education, the report states that copying and pasting may constitute plagiarism, even if unintentional; that in case of use, the type and location of the generated AI used should be clearly indicated; and that evaluation should be conducted in conjunction with activities such as quizzes and oral examinations. Furthermore, the report points out the possibility of leakage or disclosure of confidential or personal information, the need to take care not to infringe on rights pertaining to existing works, and the necessity of data literacy education as a means of fostering ethical awareness in students for this purpose [20].

4. The Direction of Japan’s Educational Policy Based on Generative AI

This study compared and examined international and national educational policies regarding the impact of generative AI on education and research, and analyzed how Japan’s educational policy is positioned. Based on the discussion in the previous chapters, this chapter explores how Japan’s policy differs from the educational policies of UNESCO, the US, and the UK, and the points that should be considered in our country’s policy based on these differences.

First, Japan has taken the approach of listing the issues involved in using generative AI as “Points to Consider in Handling Generative AI,” and recommending that specific measures be taken flexibly in accordance with the situation of educational institutions. Such an approach has the advantage of being fluid and can be adapted to the needs of the educational field. However, the lack of specific guidelines and standards may lead to confusion and heterogeneity in implementation.

Second, UNESCO's policy provides universal guidelines for the use of technology in education from an international perspective. By the very nature of being an international organization, this is considered to be an advocacy and direction for educational policy that the international community should move toward in the future.

Third, the US policy focuses on the personalization and adaptability of AI in education, and it can be said that the use of generative AI is being considered to improve the quality of education from a more positive standpoint than in the UK or Japan. On the other hand, the UK's countermeasures against the negative aspects of generative AI explicitly included specific measures against misuse. In contrast, Japan's policy does not specify specific guidelines for the application of AI to education, but rather takes the form of specifying issues to be addressed by individual educational institutions.

5. Conclusions

In order to examine educational policy based on the use and impact of generative AI, this paper compared the educational policy of UNESCO, an international organization, and the US, the UK, and Japan, which are advanced countries in the development and use of generative AI, with the Japanese educational policy. We found that UNESCO, being an international organization, has taken the policy position that its most important task is to ensure that the benefits of using generative AI are distributed as equitably as possible to people all over the world, while at the same time focusing on minimizing risks derived from the use of such AI. The US, the UK, and Japan, on the other hand, have taken a more conservative approach; these three countries, in their policy positions of governing domestic educational policy, were orienting their policies based on the fact that the risks that would be brought about from generative AI would directly affect domestic policies on education. In this context, the US policy focused on the possibilities of adaptive learning that would be possible through the use of

generative AI.

Based on these considerations, the following points should be addressed in future research. First, it will be necessary to conduct research on specific methods of applying generative AI to education and the ethical perspectives associated with such application. In addition, research is needed to collect examples of the use of generative AI in educational policy in Japan and abroad, and to reflect these examples in Japanese policy. Furthermore, ongoing research will be needed to assess the effective use of AI in education and its impact. These research issues will be the subject of future work.

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