Assessing 21st century digital literacies in Japanese higher education

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Abstract

This study examines how the seven digital learner profiles included in the International Society for Technology in Education (ISTE) standards for students apply to 193 participants in Japan, utilizing a questionnaire developed by Mills and White (2023). These profiles explore a broad range of 21st century digital skills, competencies, and literacies essential for learners to be successful in this digital age, and include both creativity and communication. The results revealed positive identification with the learner profiles (M=3.874). While Japanese learners are often found to lack digital skills, the highest mean values were associated with the profiles of Digital Citizen, Knowledge Constructor, and Computational Thinker. In contrast, the profiles of Empowered Learner, Innovative Designer, Creative Communicator, and Global Collaborator demonstrated lower mean values, particularly in more creative and communicative aspects. To ensure students are well-prepared for the digital era, therefore, fostering creativity and communication skills is crucial. There have been a lack of studies that measure the various aspects of 21st century digital skills (van Laar et al., 2020), and this study aims to add to the literature.

Keywords: digital literacies, 21st century digital skills, creativity, communication skills.

1. Introduction

In the rapidly evolving landscape of the 21st century, digital literacies initially focused on technical skills now encompass a wide range of competencies, including creativity and communication. Educational policymakers have initiated reforms to foster creative thinking and incorporate these skills into education systems; however, this endeavour has posed persistent challenges worldwide (van Laar et al., 2020), including in the Japanese context.

Despite the Japanese government's efforts to reform English language education, most still learn English through the grammar-translation method. Characterized as highly teacher-centred and examination-focused (Aubrey, 2020), this method not only fails to promote learner autonomy, active participation, and communicative abilities both in Japanese and in English, but also contributes to passive learning habits (Egitim, 2022).

Japan has also been slow to integrate 21st century digital skills (Funamori, 2017; Terashima, 2019) into educational policy, and so learner skills are similarly underdeveloped (Mills & White, 2023). How to foster learner creativity has also been an ongoing issue, and the absence of a clear definition of the concept, combined with the existing policy framework, has limited the effective promotion of creative skills among students (Smith, 2018).

The International Society for Technology in Education (ISTE) standards for students focus on leveraging technology in education to create impactful, sustainable, scalable, and equitable learning experiences for all

learners. They specifically aim to empower students by giving them a voice in their learning process, ensuring that learning becomes a student-driven endeavour. There are seven ideal learner profiles:

1. An *Empowered Learner* leverages technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals.

2. A *Digital Citizen* recognizes the rights, responsibilities, and opportunities of living in an interconnected digital world, and acts in safe, legal, and ethical ways.

3. A *Knowledge Constructor* critically curates resources using digital tools to construct knowledge, produce artefacts, and create meaningful learning experiences.

4. An *Innovative Designer* uses technologies to identify and solve problems by creating new, practical, imaginative solutions.

5. A *Computational Thinker* develops and employs strategies for understanding and solving problems using technology.

6. A *Creative Communicator* communicates clearly and creatively using appropriate platforms, tools, styles, formats, and digital media.

7. A *Global Collaborator* uses digital tools to broaden their perspectives and enrich their learning by collaborating with others locally and globally.

This study explores 21st century digital literacies with a specific focus on the significance of creativity and communication in the context of the Japanese education system, and asks the question: To what extent do Japanese university students identify with the learner profiles outlined in the ISTE Standards for students, particularly in terms of creativity and communication?

2. Method

The 193 Japanese participants in this study are from a national university in Japan that focuses on Science, Technology, Engineering, Arts and Mathematics (STEAM) education. Most of the participants were male, 83%, aged 18 or 19 years old and in their first year at university.

The survey consists of 24 items from a Likert scale instrument developed by Mills and White (2023) with responses ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) based on the seven learner profiles from the 2017 ISTE Standards (ISTE, 2017).

Data collection occurred in July 2022 using a Google Forms document on the university Learning Management System. The surveys were provided in both English and Japanese. Participants gave consent for their anonymised data to be used for research purposes. The resulting data was entered into Microsoft Excel and then transferred to JASP (JASP, 2023) for analysis.

3. Results

All the scales and subscales were acceptable with a Cronbach's alpha of .879, higher than the recommended 0.70 (George & Mallery, 2003). The mean and standard deviations are shown in Table 1 for each learner profile.

Table 1. Mean and standard deviation of all questions

Questions	Mean	SD	Learner profiles
1. I use technology to define and achieve my educational goals.	3.743	1.245	Empowered learner

2. I use technology to seek feedback that will improve my learning.	4.029	0.985	Empowered learner
3. I use technology to demonstrate my learning in a variety of ways.	3.743	1.197	Empowered learner
4. I seek out new technologies to achieve my educational goals.	3.8	1.132	Empowered learner
5. I use the Internet and social networking sites in a positive, legal, and ethical way.	4.2	0.833	Digital citizen
6. I manage my digital identity and I am aware of the permanence of my actions in the digital world.	4.571	0.698	Digital citizen
7. I understand the importance of keeping my personal data safe to maintain digital privacy and security.	4.657	0.684	Digital citizen
8. I use technology to search for information that contributes to my intellectual and creative growth.	4.257	0.657	Knowledge constructor
9. I build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.	4.029	0.857	Knowledge constructor
10. I evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.	4.057	0.639	Knowledge constructor
11. I use technology to generate new ideas, test theories, develop works of art, and solve real problems.	3.857	1.167	Innovative designer
12. I have a tolerance for ambiguity, and have the capacity to work on open-ended problems.	3.429	0.815	Innovative designer
13. When creating something new I continually test, reflect, and improve the product until I am satisfied with the result.	3.8	0.759	Innovative designer
14. I use technology to solve practical problems through a logical process.	4.314	0.758	Computational thinker
15. I can collect and analyze data using digital tools and present data in a way that demonstrates my problem-solving and decision making.	4.114	0.583	Computational thinker
16. I divide problems into their parts, extract key ideas, and develop descriptive models to understand systems or assist in problem-solving.	3.629	0.808	Computational thinker
17. I use a variety of technologies, visual instruments, models, and simulations to communicate complex ideas to others clearly and effectively.	3.629	1.114	Creative communicator
18. I create original works or responsibly repurpose or remix digital resources into new projects.	3.514	1.314	Creative communicator
19. I explain complex ideas clearly and effectively by creating or using a variety of digital solutions.	3.429	1.145	Creative communicator
20. I am able to modify my message or content for a particular audience.	3.971	0.822	Creative communicator

21. I use digital tools to communicate with learners from different backgrounds and cultures to exchange experiences and understand them.	3.571	1.065	Global collaborator
22. I use technology to work with others (peers, teachers, and others) to discuss problems from various viewpoints.	4.029	0.785	Global collaborator
23. I contribute constructively to team projects by assuming a role and responsibility to work towards a common goal.	3.371	1.239	Global collaborator
24. I explore local and global issues using technologies to work with others.	3.229	1.114	Global collaborator

4. Discussion

While previous research has found Japanese learners to be largely passive (Egitim, 2022), overall responses to the survey were positive, showing that the participants perceived themselves as empowered 21st century learners able to use technology to achieve their goals. As such, all items in *Empowered Learner* category yielded high scores, with the highest mean observed for Question 2 (using technology to seek feedback for learning improvement) showing not only learners' proactive learning strategies, but their awareness of them. It also reflects the concept of *kaizen,* continual improvement, in Japanese culture (Khayum, 2015). This finding is of specific interest in the CALL field: learners confident in the use of technology are well-placed to access the wealth of CALL resources now available to achieve language learning goals.

The participants' understanding of the importance of using technology safely and ethically, consistent with Japanese norms emphasizing social and collective responsibility (Yamamoto & Lloyd, 2019) seen in the high scores yielded by all items in the *Digital Citizen* category, is also of note. The third category with consistently high mean scores was *Knowledge Constructor*. Question 8, which focuses on using technology to search for information that contributes to intellectual and creative growth, received the highest score in this category. This is in line with the usage of technology in Japanese education for research rather than creation and collaboration (Mougenot, 2016).

The categories with the lowest mean values were related to communication, collaboration, and creativity. Whilst Japan has made efforts to improve all three in higher education (Nyugen, 2019), it appears from these results that there needs to be an increased focus on these areas. For example, while participants exhibited positivity in the *Innovative Designer* category, especially in terms of generating ideas, testing theories, and solving problems using technology, all can be achieved individually rather than in collaboration with peers. In connection with this, participants also expressed confidence in using technology to solve practical problems in the *Computational Thinker* category, but they displayed uncertainty when it came to breaking down complex problems and developing models to aid problem-solving. This can also be seen in the results for Question 18 in which the participants expressed less confidence in creating original works, again pointing to difficulties surrounding active creation. One aspect related to this is the Japanese preference for avoiding uncertainty (Yamamoto & Lloyd, 2019). This risk aversion is further evident in the lowest mean value observed for Question 12, which evaluates learners' ability to tolerate ambiguity and work on open-ended problems. On the other hand, participants felt capable of modifying their messages or content for specific audiences (Question 20, *Creative Communicator* category), possibly reflecting the influence of Japanese linguaculture in which status is clearly reflected in language and so constant modification and adaption is necessary (Maruki, 2022).

Finally, the lowest mean score recorded in the *Global Collaborator* category was for Question 24, showing participants' lack of confidence in exploring local and global issues using technology. Question 22, however, about using technology to collaborate and discuss problems from different perspectives, yielded a comparatively high mean. The presence of the word 'teachers' in the question might have influenced participants by contributing to their sense of comfort. This could be due to a cultural inclination towards teacher dependence in Japanese culture.

Similarly, because Japanese students are taught to be more comfortable with discussion and research rather than action (Nyugen, 2019), the word 'discuss' may have also influenced participants' responses to this item.

Despite the valuable insights gained from this study, there are certain limitations. While efficient for gathering data, self-reporting questionnaires may suffer from potential biases, such as overestimation of abilities. Future research should therefore explore alternative methods to complement and validate these findings (Hargittai, 2005). Additionally, while this study examines how university students perceive their own digital literacy, studies that more specifically explore the interplay of creativity and communication in digital literacy need to be undertaken so that effective policies to achieve them can be developed. This article is part of one such larger project that aims to do so.

5. Conclusions

In contrast to existing research about Japanese students' learning styles, this study found that participants positively perceived themselves as independent and digitally literate 21st century learners. Even though the university where this research was undertaken is noted for its design-based, innovative curriculum (Mougenot, 2016), the balance between uncertainty, avoidance, and risk-taking in creative and online work needs to be further improved as the participants felt less confident in their communication, collaborative, and creative skills. To adequately prepare students for success in the technology-driven world, policymakers and educators must focus on developing these CALL skills alongside technical expertise. By nurturing such skills, educational systems can empower learners to become innovative problem solvers, effective communicators, and global collaborators, well-equipped to thrive in the dynamic digital era.

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