# Virtual Student Mobility from Students' Perspectives: Case study from Japan

Ariunaa Enkhtur*, Ming Li**, and Xixi Zhang***

**Abstract.** International student exchange is integral to internationalization at higher education institutions and global human resource development in Japan. However, border closures and restrictions on physical mobility since 2020 due to the Covid-19 pandemic forced universities to adopt virtual mobility models to deliver international exchange programs. This study explores students' experiences of taking virtual exchange programs and their pedagogical implications for future virtual exchange programs. In this paper, we present one case of virtual student mobility implemented at one national university in Japan. Analysis of multiple data sets, including student surveys (n=789), reflection papers (n=420), and interviews with a program administrator and a faculty member, revealed that this type of virtual student mobility program has strong merits in promoting internationalization activities. Students were satisfied with the diverse interdisciplinary academic content, flexibility in taking the course, and opportunity to engage with the host university faculty members and international students. Many have expressed their interest in studying at the host university in person.

**Keywords:** internationalization of higher education, virtual student mobility, students' perspectives, Japanese university, case study

## Virtual student mobility from students' perspectives: Case study from Japan

Opportunities for students to engage in international exchange without traveling abroad became necessary during the Covid-19 pandemic. The literature on international student mobility demonstrates the impact of study abroad experience in developing intercultural skills (Jackson, 2015), perspective transformation (e.g., Kumi-Yeboah & James, 2014), and personal and professional competencies

* Assistant Professor, Center for Global Initiatives, Osaka University, Japan, e-mail: enkhtur.ariunaa.cgin@osaka-u.ac.jp *Corresponding author
** Assistant Professor, Center for Global Initiatives, Osaka University, Japan, e-mail: li.ming.cgin@osaka-u.ac.jp
*** Assistant Professor, Center for Global Initiatives, Osaka University, Japan, e-mail: sissizhang.cgin@osaka-u.ac.jp

(Dwyer, 2004) that employers value (Yokota et al., 2016). However, most students around the world do not have access to study abroad programs. Globally, the 6 million students studying outside their home countries as of 2019 represent only 2% of the total student population in tertiary education (UNESCO UIS, 2022). This confirms that most of the world student population does not participate in international education exchange, particularly those from low-income backgrounds (Universities UK, 2019; Enkhtur, 2018), minority students, students with disabilities, and working students (Salisbury et al., 2011).

In Japan, physical student mobility has been one of the main strategies for the internationalization of higher education. The government introduced a series of policies and projects targeting this goal, such as increasing the total inbound international students to 300,000 and outbound students to 120,000 by 2020 (Ota, 2018). Although the number of international student visa holders in 2019 reached the goal of 300,000, over 90% were from Asia (JASSO, 2019). On the other hand, the number of outbound students did not reach the goal. Some reasons include the long-term economic stagnation, decreased family income, increased cost of studying abroad, a lengthy and standardized job-hunting process, perceived lack of language skills, lack of motivation to study abroad overall, and perceived risks of living overseas (Yokota, Ota, & Shimmi, 2018). Given this lack of diversity among inbound students and a large portion of immobile domestic students, Japanese universities are interested in integrating online exchange components in their international exchange modules to reach diverse students and offer intercultural learning for domestic students (MEXT, 2020). In Japan, while the government has supported collaborative online exchange programs (e.g., Re-inventing Japan Inter-university exchange project), it was Covid-19 pandemic that has accelerated universities to adopt virtual models in internationalization activities (Sato, 2022).

The digital gap and lack of equal access to technology still impede students' access to online education (Lai & Widmar, 2021). However, emerging studies (Finardi & Guimaraes, 2020) show that increased online and open-access engagement among academic communities helps universities strengthen their participation in global discourses through academic conferences, workshops, and meetings held online. As universities emerge from the pandemic restrictions and more countries open borders to physical mobility, virtual and online student mobility programs need to be examined for their potential to complement internationalization strategies at higher education institutions. This paper examines the implications of introducing virtual mobility courses from students' perspectives through a case study in a Japanese national university.

## Virtual student mobility

A recent UNESCO report defined "virtual student mobility" as "a form of mobility that uses information and communication technologies to facilitate cross-border and/or inter-institutional academic, cultural, and experiential exchanges and collaboration" (UNESCO IESALC, 2022, p. 6). It

is broader in scope, contents, and course delivery than existing virtual exchange models—Collaborative Online International Learning (COIL), Globally Network Learning (GNL), Telecommunication, or Tandem programs—some of which have existed for over 20 years (UNESCO IESALC, 2022; O'Dowd, 2021). For example, COIL, created by the State University of New York (SUNY) in 2006, primarily focuses on collaboration between institutions in delivering courses mainly to develop intercultural and language communication skills (Ikeda, 2022). While multiple universities can participate in one program, the student exchange is usually between two groups from different countries/languages. Another example, Erasmus+ Virtual Exchange, on the other hand, may involve a large number of institutions; however, the main aim is to build intercultural sensitivity, foster increased tolerance of different cultural perspectives, and promote collaboration. Similarly, most international virtual exchanges in East Asia have been introduced in specific subject areas, such as language programs, and have been less known in the higher education mainstream (Akiyama & Cunningham, 2017; Çiftçi, 2016). On the other hand, the programs introduced during the COVID pandemic have been diverse in content and broader in scope (UNESCO IESALC, 2022), including course sharing between institutions, internship programs, and collaboration on academic projects (Stevens Initiative, 2021).

With increasing interest in virtual student mobility (VSM) since the Covid-19 pandemic, recent studies have attempted to map VSM programs, analyze their typologies, and build common frameworks across the institutional settings (e.g., Stevens Initiatives Report series, 2020, 2021; O'Dowd, 2021; Machwate et al., 2021; Shimmi et al., 2021). For example, Stevens Initiative (2021) found that most virtual mobility programs were much shorter than a short-term physical exchange, used English as the primary medium of course language, and that programs in the US and Europe were more represented in their studies.

In Japan, universities adopted emergency virtual mobility programs and were able to attract a large pool of students (Shimmi, Ota, & Hoshino, 2021). Given the success and interest in these programs, and the increasing use of digital technologies, Shimmi et al. (2021) recommended the future use of VSM programs as a regular activity even after universities shift back to physical mobility. A survey by the Ministry of Education, Culture, Sports, Science, and Technology in Japan (MEXT) found that top universities in Japan were willing to develop blended and hybrid exchange programs (MEXT, 2020). In this survey of universities participating in the Top Global University project, 86% said they would develop blended/hybrid international mobility programs. Also, the government is supporting initiatives for increased virtual education programs. For example, a new project, "Japan Forum for Internationalization of Universities (JFIU)", was established in 2021 by MEXT to strengthen the internationalization activities of leading Japanese universities through increased use of ICT (Sato, 2022).

The existing research on the impact of ICT-mediated international exchange programs on student learning mainly focuses on certain types, such as telecollaboration, e-tandem, COIL, Erasmus+ Virtual

Exchange, or locations mainly in North America and Europe. For example, the large-scale study by Evaluate Group (Baroni et al., 2019) involved over 1000 future teachers of telecollaborative programs as part of the Erasmus+ project in Europe. The study conducted pre- and post-program surveys on intercultural communication, language, and digital pedagogical competence. As a result, the study found a steady growth in pedagogical and language skills among learners (Baroni et al., 2019). The Stevens Initiative (2020) report on student learning included virtual exchange programs from the Middle East and North America. The report concluded that students' "knowledge of other country or culture" significantly increased while cross-cultural communication skills did not change significantly. In Japan, despite increasing awareness of virtual student mobility programs, there are limited empirical studies examining the implication of such programs for internationalization strategies. While the diverse virtual modules, different objectives, and structure of programs make it challenging to replicate previous studies or generalize findings, emerging case studies in changing higher education landscape can help educators reimagine student mobility in their local contexts.

## Introduction to the case study site

Osaka University is one of the top national universities in Japan and was selected as a Designated National University Corporation by MEXT in 2018. Before Covid, Osaka University had a few programs conducted online; however, individual schools or centers implemented such programs in isolation, and the number of partner universities and the scope of course subjects were narrow. For example, the school of human sciences had a distance education program with students in Afghanistan in 2002 (Matsukawa et al., 2004). The North American Center for Academic Initiatives has been running an international distance education program for over 17 years enabling Osaka University students to attend online classes given by experts from the US (Muroka, 2006). The distance-learning Japanese language classes at the Center for Japanese Language and Culture that have been running since 2015 began to expand, offering the program to several partner universities overseas from 2020 (CJLC, 2022). More collaborative, interdisciplinary online courses have been offered by the Co* Design Center that introduced creative pedagogical approaches. Despite these niche programs, the international exchanges mainly relied on physical exchange. In 2020, as an emergency response to the pandemic border closures, the university began offering several opportunities for students to engage in international education using online mediums. Examples include designing new virtual exchange courses and establishing renewed bilateral and multilateral virtual exchange memorandums. These new agreements make it possible to share course contents with partner universities, exchange students, and facilitate credit transfers without extra charges from students.

*Case study: Osaka University Anniversary Lecture Series*

In 2021, Osaka University organized a series of short-term credit-bearing online courses as part of its 90th anniversary (Fujita & Tsuji, 2021). The initiative brought together 39 prominent faculty members from its 15 schools, graduate schools, institutes, and centers to create 11 interdisciplinary courses around the SDGs, natural sciences, humanities, social sciences, and medical science (Table 1). As a result, each course involved 3-4 faculty members teaching the same topic from their own disciplinary and research perspectives. Each course consisted of 8 lectures and optional extra- and co-curricular activities across 3 months. The courses were open to Osaka University students and its partner universities, mainly targeting undergraduate students. In order to make the course more accessible, each lecture and discussion session was recorded, which enabled students to watch it on demand.

**Table 1. Courses offered and number of students enrolled per course**

| No. | Course Name | Number of students (Number of partner universities) |
|---|---|---|
| 1 | SDGs I: Chemical Approaches for Sustainable Development Goals (SDGs) | 62 (18) |
| 2 | SDGs II: SDGs and Asia Pacific Region | 221 (28) |
| 3 | SDGs III: Aligning the Sustainable Development Goals and Climate Science | 116 (28) |
| 4 | Natural Sciences I: Material, Bio. and Synthetic Chemistry | 59 (17) |
| 5 | Natural Sciences Il: Quantum Information Science | 187 (24) |
| 6 | Natural Sciences III: Science and Society in Nanoscience and Nanotechnology as Manufacturing Core | 48 (14) |
| 7 | Natural Sciences IV: Advanced Biotechnology and Industry | 103 (18) |
| 8 | Humanities and Social Sciences I: UNESCO Chair in Global Health and Education | 230 (27) |
| 9 | Humanities and Social Sciences II: Digital Transformation (DX) and Modern Society | 76 (16) |
| 10 | Humanities and Social Sciences III: Halal Science | 144 (12) |
| 11 | Medical and Life Sciences I: Medical Science | 178 (22) |
| | Total | 1,424 students |

As a result, 1,424 students from 42 universities in 17 regions/countries enrolled in 11 online courses. One student could sign up for one course only. On average, 1-5 students enrolled per course per partner university. Although each course had slightly different learning objectives based on its content area, they all aimed to enable partner university students to 1) sample and learn from Osaka University's most prominent researchers, 2) improve debating skills through discussions, and 3) gain

knowledge about solving societal issues. In addition to academic course contents ranging from humanities to engineering to natural or medical sciences, students participated in co-curricular programs such as lab tours, campus tours, or discussion sessions around social issues. To complete the course, students had to write a reflection paper although the topic question, the length, and the number of submissions varied by each course or instructor. Some courses assigned weekly reflection notes, while others required only one final paper at the end of the course. In addition, at the end of the course, each student was asked to complete a course evaluation form, anonymously.

## *Methodology*

This study used a case study research method (Yin, 2017) to examine the implications of introducing virtual mobility courses in a Japanese national university from students' point of view. The case study method allows the researchers to build a holistic understanding of the virtual mobility program and examine students' perspectives at the case institution by collecting data from multiple sources. The researchers selected this site for the case study because they had insider knowledge and could observe this process over the last two years, collecting essential data from students and interpreting it through insider lenses.

Among virtual study abroad programs at the institution, the anniversary course program was unique for involving many faculty members across schools, graduate schools, or institutes in creating an interdisciplinary virtual program that enrolled the largest cohort of students from partner universities (Table 2).

**Table 2. Students by countries/regions**

| Country/Region | Number of students |
|---|---|
| Austria | 1 |
| Brunei Darussalam | 139 |
| Canada | 35 |
| Colombia | 1 |
| Germany | 103 |
| Hong Kong (the People's Republic of China) | 1 |
| Indonesia | 193 |
| Japan | 32 |
| Netherlands | 11 |
| Philippines | 45 |
| Singapore | 11 |
| Sweden | 16 |
| Taiwan | 11 |
| The People's Republic of China | 596 |
| Thailand | 4 |
| The United Kingdom | 147 |
| The United States of America | 12 |
| Vietnam | 66 |
| Total registered students | 1424 |

The data sets in this case study include an anonymous course evaluation survey by students and selected course reflection papers (Table 3). The course administrator developed the survey with 26 items to evaluate the program and improve the course structure based on students' perceptions. The questions consisted of two multiple-choice questions designed to understand the motivation of the students to enroll in the program and the challenges faced by the students, four questions designed to assess satisfaction rate (Likert rating ranging from 1=Unsatisfactory to 4=Very satisfactory), level of change in perception about the host university after taking the course (Likert rating 1=Not changed, 2=Changed, 3=Changed very much), likelihood to recommend the program (Likert rating ranging 1=Not recommend to 3=Extremely recommend), interest in studying at host university onsite in the future (1=Yes, 2=No). In addition, the questionnaire included five open-ended questions that aimed to elaborate on students' answers in the survey by asking, "Why did you select this answer to this question". The administrator shared the questionnaire with faculty members and revised it according to suggestions. Then, the survey was uploaded to the host university's learning management system (LMS), and students received an email asking to participate voluntarily. The survey was open for one month, and students were reminded once to respond. As a result, 55% of the students (n=789) completed the survey.

We utilized SPSS software to conduct a descriptive analysis of the survey data. Non-parametric Mann-Whitney *U* and Chi-square tests were used to clarify factors related to students' satisfaction with the course.

**Table 3. Overview of research data from students**

| Data type | Respondents | Percentage |
|---|---|---|
| 1. Anonymous course evaluation survey | 789 | 55% |
| 2. Reflection paper on virtual student experience | 420 | 29.2% |

In addition, we selected four courses that specifically asked students to reflect on their experience in the course overall, share impressions of the course, and write about their challenges and learning outcomes. The other seven courses asked students to respond to specific questions in the field of study or the lecture contents; thus, did not necessarily yield information on students' virtual learning experience; therefore, we did not use them in the analysis.

The demographic information of students who took these four courses is presented in Table 4. These students were mostly undergraduate students from Asia, similar to the overall course population. The total number of students in these four courses was 467; however, there were 420 reflection papers. Some students wrote their full information on the papers (field of study and home university) whereas others provided little or no information about themselves since professors could evaluate students directly in the LMS.

**Table 4. The demographic information of students in four courses**

| | **SDGs I**: Chemical Approaches for SDGs (N=58) | **Natural Sciences II** : Quantum Information Science (N=187) | **Natural Sciences III**: Science and Society in Nanoscience and Nanotechnology as Manufacturing Core (N=48) | **Medical and Life Sciences I** : Medical Science (N=175) |
|---|---|---|---|---|
| **Gender** | | | | |
| Female | 26 | 59 | 23 | 115 |
| Male | 32 | 127 | 25 | 60 |
| **Current program level at home university** | | | | |
| Undergraduate | 48 | 161 | 35 | 126 |
| Master | 7 | 22 | 12 | 46 |
| Doctoral | 3 | 3 | 1 | 3 |
| **Country/region** | | | | |
| Brunei Darussalam | 2 | 3 | 1 | 3 |
| Canada | 2 | 20 | 0 | 5 |
| Germany | 14 | 11 | 0 | 19 |
| Indonesia | 3 | 5 | 14 | 55 |
| Netherlands | 0 | 6 | 0 | 0 |
| Philippines | 4 | 0 | 3 | 7 |
| Singapore | 0 | 3 | 1 | 3 |
| Sweden | 0 | 8 | 0 | 1 |
| Taiwan | 0 | 1 | 0 | 0 |
| The People's Repubic of China | 24 | 112 | 23 | 31 |
| Thailand | 1 | 0 | 0 | 0 |
| The United Kingdom | 7 | 15 | 0 | 48 |
| The United States of America | 1 | 2 | 0 | 0 |
| Vietnam | 0 | 0 | 6 | 3 |

We thematically analyzed the reflection papers and students' comments in the survey (answers to open-ended questions) using NVivo. Using a thematic analysis approach (Braun & Clarke, 2014), we created overall 15 main nodes or codes (perspective change on content area, online learning, Japan, communication skills development, challenges of virtual programs, or future interest in physical mobility at the host university) and created to five main categories (overall perceptions of VSM, challenges, benefits of VSM including skills and content learning, future prospect of physical mobility).

Finally, we compared the quantitative and qualitative data analysis and developed semi-structured interview questions for an administrator and a professor to confirm and triangulate the findings. We approached an administrator of the program and a professor who led one of the courses for their knowledge of the program process and their close interaction with students. The administrator was a mid-level staff member in the international affairs division who oversaw designing and coordinating the program. The professor was from the engineering school, who taught and led one of the four courses of which we analyzed the reflection papers (Table 4). We asked for their perceptions of our findings and thoughts on future perspectives of VSM based on their experiences conducting the course, interacting with students, and delivering the program.

Both interviewees accepted our request through email and scheduled an in-person interview date and time. We sent the interview protocol, consisting of a consent form and semi-structured interview probes. Each interview was conducted in Japanese, continued for one hour and was recorded in full. We transcribed the interview and used NVivo software to analyze the interview data. The interview data was used mainly to elaborate the findings from students' data. The researchers translated parts of the interviews to present in this paper.

## Findings

### *Factors relevant to students' satisfaction in the VSM course*

A non-parametric Mann-Whitney test was carried out on questionnaire results ($N$=789) to test whether students' level of satisfaction with the course was dependent on a) the time difference (whether they had difficulties due to a long time difference or not) and their mode of taking the class (live or on-demand), b) other challenges with the course (difficulties with assignment, difficulties navigating the online learning management system, difficulties with communicating contacting faculties), and c) their motivation to take the course (interest in the academic content, interest in the university, to get a credit, or because the course was offered on-demand).

#### Time difference and mode of learning

A Mann-Whitney test indicated that there was no statistically significant difference in satisfaction between students who did not have difficulties attending the course due to time difference ($Mdn$=3) and those who had difficulties due to time difference ($Mdn$=3), $U$ ($n_{\text{no difficulty}}$=397, $n$=387 $_{\text{had difficulty}}$)=72743.50, $z$=-1.38, $p$=.165, $r$=0.04. Also, satisfaction was higher for students who took the live class ($Mdn$=3) than students who took on-demand courses ($Mdn$=3). However, the Mann-Whitney test showed that this difference was not statistically different $U$($n_{\text{on demand}}$=547, $n$=233$_{\text{live}}$)=68426.50, $z$=-1.85, $p$=.064, $r$=0.06.

**Table 5. Mann-Whitney U Test result for students' satisfaction level by time difference and mode of learning**

| **Difficulties with the course due to long time difference** | **n** | **Mean Rank** | ***U*** | ***p*** |
|---|---|---|---|---|
| Yes | 386 | 381.95 | 72743.50 | .165 |
| No | 397 | 401.77 | | |
| **Mode of learning** | **n** | **Mean Rank** | ***U*** | ***p*** |
| On demand | 547 | 381.91 | 68426.50 | 0.064 |
| Live | 233 | 410.68 | | |

The analysis of students' reflection papers showed that students preferred accessing on-demand materials, particularly lecture recordings that introduced new academic content, such as theories or research instruments. Students reported that this way they could study the materials at their own learning pace. The faculty member also confirmed this tendency:

> *Especially, for science subjects, it's important to offer on-demand courses to complement the live lectures because the contents are sometimes hard for students to understand…for example, in my course, there was a student who said he watched the quantum science lectures 8 times to fully grasp the contents. (Professor of engineering)*

On the other hand, students preferred attending live discussion sessions to ask questions, brainstorm ideas with peers, and feel the international environment. For example, the following students wrote:

> *I liked the discussion after lectures and the opportunity to react and reflect with the assignments. (Social science student, Vietnam)*

> *I prefer the live course because I can interact with faculties and enjoy the international environment. However, [the] on-demand option is useful, or when I have many other commitments, like my classes scheduled at the same time. (Engineering student, Indonesia)*

The quantitative analysis did not confirm previous studies (e.g., Elshami et al., 2021) that reported that students' time differences impacted their satisfaction with the course. However, as students indicated more interest in interactions with faculties and students, the time differences will hinder their experiences in future virtual exchange programs as such programs become common.

## Other challenges with the course

From the survey, we found that most students did not find the course assignments or navigating the LMS difficult (Table 6). The Mann-Whitney test showed that those who had difficulties with assignments were less satisfied (*Mdn*=3) than those who had no difficulties with assignments (*Mdn*=3), $U(n_{\text{had difficulty}}=125, n_{\text{no difficulty}}=658)=33925.00$, $z=-3.51$, $p<.001$, with a small effect size

$r$=0.12. Also, the Mann-Whitney test found that students who had difficulties with navigating the LMS were less satisfied ($Mdn$=3) than students who had no difficulties in navigating the LMS ($Mdn$=3), $U(n_{\text{had difficulty}}=271, n_{\text{no difficulty}}=512)=63790.00$, $z$=-2.1, $p$=.036, $r$=.07.

**Table 6. Mann-Whitney U Test results for students' satisfaction level by their perceived difficulties with assignments or difficulties of navigating the learning management system (LMS)**

| The assignments were difficult | *n* | Mean Rank | *U* | *p* |
|---|---|---|---|---|
| Yes | 125 | 402.94 | 33925.00 | <0.001 |
| No | 658 | 334.40 | | |
| **Had difficulty in navigating the LMS** | ***n*** | **Mean Rank** | ***U*** | ***p*** |
| Yes | 271 | 371.39 | 63790.00 | .036 |
| No | 512 | 402.91 | | |

The course was open to students from all majors and backgrounds; therefore, some students could have lacked background knowledge to complete assignments. On the other hand, all course materials, on-demand videos, and assignment submissions were available only at the host university's LMS. Many students reported difficulty learning about the new management system that the host university had created for them because they were unfamiliar with the system, and sometimes the platform was in Japanese (these students did not know how to change the language). The administrator in charge of the course management explained:

> *For various purposes, such as allocating credits or ensuring security, we had to use our LMS for this course. For this purpose, we collected students' information from their home universities, then created an LMS account for each student and shared the account information with each student. Once enrolled, students could use their private emails to receive notices from the instructors; however, they had to go through the LMS to watch the on-demand videos, access course materials, and submit assignments. We supported students accessing and navigating the LMS during the course through emails. However, some students could have dropped out from the course when they could not figure out the LMS. (Program administrator)*

This finding supports previous studies that reported "managing LMS" as one of the main challenges reported by students and administrators. For example, Rosen (2019) reported that students enrolled in Virtual Exchange Programs missed important announcements, assignment details, and class times due to not following the host university's LMS. Students must manage their home university courses, so they follow their home university LMS and forget to check the host university system (Rose, 2019). Similarly, because students follow different academic calendars, their breaks, exam period, and class times can differ, contributing to the factors of why they sometimes do not check the LMS.

Students' satisfaction levels varied by their motivations to enroll in the course

The Mann-Whitney tests showed that the level of satisfaction was statistically higher for students whose motivations were to enroll in class for its academic contents (*Mdn*=3, *n*=664) *U*=43960.50, *z*=.026, *r*=.08; because they were interested in learning about the host university (*Mdn*=3, *n*=558,) *U*=70170.00, *z*=-2.92, *p*=.003, with a small size effect *r*=.1, and because the course made it possible to watch on-demand recordings (*Mdn*=3, n=275), *U*=64255.00, *z*=-2.1, *p*=.036, *r*=.07.

**Table 7. Mann-Whitney U Test results for students' satisfaction level by their motivation to take the course**

| **Motivation: because I was interested in the academic contents** | ***n*** | **Mean Rank** | ***U*** | ***p*** |
|---|---|---|---|---|
| Yes | 664 | 398.71 | 43960.50 | .026 |
| No | 119 | 354.58 | | |
| **Motivation: because I was interested in the host university** | ***n*** | **Mean Rank** | ***U*** | ***p*** |
| Yes | 558 | 405.25 | 70170.00 | .003 |
| No | 225 | 359.13 | | |
| **Motivation: because credit was offered** | ***n*** | **Mean Rank** | ***U*** | ***p*** |
| Yes | 159 | 400.99 | 51037.00 | .525 |
| No | 624 | 389.71 | | |
| **Motivation: because the course was available on-demand** | ***n*** | **Mean Rank** | ***U*** | ***p*** |
| Yes | 275 | 412.35 | 64255.00 | .036 |
| No | 508 | 380.99 | | |

In reflection papers, students wrote that they wanted to learn about "forward-looking", "cutting-edge", and "new technologies" from these virtual courses. They appreciated that these courses were open for students from all major fields and that they could hear from faculties from different disciplinary backgrounds. For example, some students wrote:

> *What I didn't expect was to learn more about Japanese culture and its interaction with technology, its forward-looking ideas in Quantum Computing, and the wide-ranging applications of Quantum Computing in our everyday lives. Furthermore, I have a wider understanding of emerging technologies within Quantum Computing, which will be very important for my dreams within the education sector. (Management program student, the UK)*

> *I really liked that the lectures each centered around a different topic and there were many different speakers, which made it diverse. (Engineering student, China)*

Although many virtual exchange courses exist in subject areas such as language or intercultural learning programs (Lee et al., 2022), a few courses are available that introduce universities' cutting-edge research areas in their internationally renowned fields (Stevens Initiative, 2021). The subjects offered across 11 courses in this study all aimed to showcase and introduce the host universities' some of the most renowned researchers and their research areas.

### *Virtual student mobility complimenting physical mobility*

The majority of survey respondents (89%, $n$=693) indicated that they would like to study at the host university in-person in the future. Of them, 48% (n=367) preferred onsite short-term exchange programs, while the rest indicated their interest in onsite degree programs, mainly at a graduate level. A series of chi-square tests of independence was performed to examine the relation between students' motivation to take the course and intention to study at the host university; the relation between satisfaction level and intention to study at the host university; the relation between satisfaction level and change in the impressions about the host university.

The relation between the variables "interest in learning about the host university" and "interest in studying at host university in-person" was significant, $X^2$(1, N=775) =80.173, $p$<.001 (2-sided), $V$=.322. Students interested in learning about the host university were more likely to indicate that they were interested in studying at the host university in person. Also, the relation between variables "satisfaction level" and "change in impression about the host university variables" was significant, $X^2$ (3, $n$=775) =27.702, $p$<.001, $V$=.118. In other words, students who were satisfied with the course were more likely to say that they would like to study at the host institution.

Moreover, the survey found that 62.3% ($n$=492) of respondents' impression about the host university changed due to taking this course online, and almost all respondents (99%, $n$=782) said they would recommend the course to their friends if offered again. Some students elaborated on this change:

> *I hope I could study here. My impression changed because I just found out about the innovation of research and technology developed at the university. (Anonymous respondent in the survey).*

> *I thought most Japanese universities only use Japanese as their communication, but after joining this program, I realized that OU is also available for international students who have no Japanese at all. (Anonymous respondent in the survey).*

These results indicate the effectiveness of short-term virtual student mobility programs in promoting the host university as a potential study-abroad destination. Interviews with the administrator and the faculty member also showed that the university recognized the merits of organizing this learning experience to promote its internationalization activities:

*Since implementing this program, we have expanded the scope of virtual programs to include a mutual exchange. This means we offer courses to our partner university students, and they also offer courses for our students. I think these exchanges are fruitful for students who cannot travel overseas for various reasons and those who are preparing to travel. They can learn about the host university before making financial, time, and other commitments to travel in-person. (Program administrator)*

Lee et al. (2022)'s longitudinal quantitative study found that "students who have taken an international virtual exchange course are roughly twice as likely to subsequently study abroad as those who do not take such courses" (p. 213). This finding supports the "exposure effect" theory (Lee et al., 2022; Goldstein & Kim, 2006) that students' exposure to another culture can increase students' interest in studying abroad. In addition, even if students do not travel physically, their impression of the host university has implications for the university's overseas reputation among students.

Students also mentioned that even if they may not study abroad in the future, being able to participate in international exchange through the online medium was useful to them. One student wrote in the reflection paper:

*I cannot afford to study abroad because I work part-time. The on-demand course made an opportunity to take the course flexibly. (Anonymous)*

*Some students can't afford to study abroad because their families are poor (like me), but they especially want to learn new technologies from different countries. I would not have travelled to Osaka University to participate in the course if it was onsite. (Engineering student, China)*

VSM has the potential to expand access to international education and offer opportunities to experience other countries' ways of teaching and learning and interact with diverse students online. The VSM courses in this study did not charge additional fees for the credit because the partner universities had made virtual exchange agreements that would allow universities to grant credits. While students may lack access to technologies or internet connections, the partner universities may provide these technologies and internet connections through their facilities on campus. This kind of open and accessible program is key to ensuring students are not excluded from international learning experiences due to financial reasons. A student also wrote that she appreciated the "inclusiveness" of this course:

*The lectures have taught me that learning experiences are now more diverse due to the fact that everything is now online, and it is worth noting that inclusion is a critical component in ensuring that everyone has equal access to education in general. (IST student, Indonesia)*

However, at the same time, students viewed virtual programs as "substitutes", "supplementary" to physical mobility, and temporary. Some wrote:

> *I thought the lecture series was a super cool opportunity to "study abroad" in a very accessible format since we can't travel safely right now. (Math student, Canada)*

> *I am looking forward to being able to follow similar lectures/discussions onsite and have a true interaction with professors. (Computer science student, Germany)*

One reason is that students were tired of taking all classes online. The course was offered when most students around the world were learning online. It means that these students were also taking their home university classes online. Students wrote about being fatigued from a computer sitting behind the screen for hours:

> *The lectures were very interesting, despite the fact that I suffered very much from having to follow them on zoom. (Engineering student, Netherlands)*

> *Sometimes the on-demand videos [90 min] were too long, and I got distracted from finishing one lecture on the spot, but rather watch it on my own pace. (Health science student, China)*

Students enjoyed shorter-length videos (on-demand) and more time for interactions with faculty and peer students for live Q&A, discussion, and collaborative work. One Indonesian student said, "the lectures were very interesting and full of information. Although there were breakout room discussions, it would be nice to increase such interactions with faculties and students in the future." While others called for shorter lectures that would not exceed 30 minutes.

As previous literature strongly asserts (O'Dowd, 2021), creating courses specifically designed for online delivery is essential. The findings in this study also showed that a 90-minute regular course is too long for online class, especially if the class hours are mostly lecture-based. The course could have received high interest from students partially because this was the first time the university opened its courses in its pioneering subject areas by their prominent faculty members for a large number of students at partner universities. However, if the course delivery and pedagogy are not updated for virtual models, students might lose interest over time. One way is to include more interaction during live classes and on-demand materials to study academic content, as students mentioned in their papers.

## Discussion and conclusion

The Covid-19 pandemic restriction on international mobility urges international educators to review their approach to internationalization strategies. While universities in Japan started resuming their physical student mobility programs, the students' experiences we collected during the pandemic to

effectively utilize digital learning for more open, accessible international education activities should not be discarded. Global experts on the internationalization of higher education call for more personalized, flexible international education, predicting that "digital learning" will increasingly play a crucial role in the internationalization practice (Liu & Gao, 2022, p. 8). In this context, we examined the VSM case at one of Japan's oldest and largest national universities. Analyzing multiple data sources from insider and outsider perspectives, we explored factors related to students' satisfaction with the course and their intention to study abroad.

Our findings suggest that VSM courses have the potential to complement internationalization strategies at higher education institutions by introducing the host institution's teaching style, the faculty members, and their research areas to a large number of students. Students in this study noted a significant change in their perception of Japanese universities and the programs and research opportunities available for international students. This "exposure" role in international student exchange is important for the host university to attract diverse, highly talented students in the future. Many students were drawn to this program because they were interested in taking diverse academic courses from well-known faculty, particularly if they are exploring options to study abroad for graduate schools. However, we need to track and assess whether these students apply to the host university's degree programs in the future. Although many other factors influence students' decision to study abroad, we need to explore further how VSM courses motivate students to participate in international activities in the future. On the other hand, participation in virtual exchange could decrease students' interest in physically studying abroad if they see VSM as equal to physical exchange. Although this study did not find that students' interest in study abroad decreases due to the VSM, it needs to be further examined.

The study also supported the potential of VSM to increase accessibility to international education. Some students noted that they could not afford to travel abroad due to work, other responsibilities, or financial reasons. For these students, even if they cannot afford physical exchange, VSM programs offer unique opportunities to learn and expand their horizons. In the future, these programs could be specifically designed for students from disadvantaged backgrounds or for universities from the global south that have been traditionally left behind in the global competition for knowledge.

Moreover, the findings demonstrated the need to carefully plan and design virtual programs considering academic content, mode of delivery, program length, assignments, and support for students to engage in class and navigate LMS. Although this study did not confirm previous studies (e.g., Elshami et al., 2021) that reported time differences and difficulty with assignments as important factors in students' satisfaction with the course, further evaluation is necessary as the university offers virtual programs. As students' former excitement of being able to attend the university's courses online decreases with the increasing availability of virtual courses, the time differences, program structure, and delivery mode could play important roles in students' satisfaction.

The factors from this study that influenced students' satisfaction and their further interest in international exchange activities—interdisciplinary academic contents, flexible program mode (both on-demand and live), and inclusion of diverse faculty members in each course—are useful for universities in planning for and strengthening their internationalization approach. Merits of such programs are not limited to internationalization efforts but also universities' role in addressing and contributing to sustainable development—increasing access to education, particularly to students who otherwise would not travel abroad.

Finally, several limitations in this study need to be considered in interpreting the findings. First, the end-of-the-course survey does not include students' demographic information limiting researchers to analyze their responses by students' program level, gender, age, nationality, and field of studies. In addition, we could not interview students about their personal experiences due to lack of contact information. Our future studies will collect this critical information to explore students' lived experiences. Overall, we need better evaluation throughout the VSM courses and to conduct a longitudinal study to explore the impact of VSM on their future participation in international education.

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