Japanese dental students’ perceptions of videoconferencing lectures in the global classroom

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**Abstract**

**Purpose:** Research-informed teaching is a crucial component of university education, and exposure to lectures by world scientists is one way to motivate undergraduate students to develop the future of dentistry. This study aimed to examine dental students’ perceptions of international videoconferencing lectures on basic/clinical research, as well as Japanese dental students’ perceptions of the use of videoconferencing lectures in large classes.

**Methods:** We administered a questionnaire survey to senior undergraduate students in dental schools that participated in videoconferencing lectures in 2015/2016 in Japan (n=92) and Indonesia (n=175) and analyzed the data quantitatively and qualitatively.

**Results:** Half of the Japanese and Indonesian students reported being motivated by the presence of foreign dental students in the videoconferencing lectures although there were significant differences between the Japanese and Indonesian students on the English ability. Japanese students were divided into six clusters according to their general evaluation of the lectures, their English abilities, and their understanding of the lecture topics.

**Conclusion:** Overall, many undergraduate dental students reported being motivated by international videoconferencing lectures in large classes. Therefore, using international videoconferencing lectures on basic/clinical research, while overcoming the limited English abilities of the participants, could serve as an effective instructional method for Japanese dental students.

**Keywords:** research, undergraduate dental education, videoconferencing

**Introduction**

Videoconferencing can be defined as synchronous and interactive voice, video, and data transfer between two or more places via communication lines (Gough 2006). For decades, it has been used as a tool for distance learning.
across academic levels, due to its ability to overcome physical boundaries. Videoconferencing has the potential to create global classrooms and can foster educational collaboration while enhancing the experiences of learning communities (Martin 2005). On the other hand, it has some weaknesses and aspects that are unfamiliar to students; thus, introducing the system to students before they take a course via videoconferencing is important in order to decrease student misunderstanding (Karal et al. 2011).

Research-informed teaching is the essence of higher education at university, and in Japanese dental education, the model core curriculum for required graduation competencies cites "cultivation of a research mindset" as one of its goals (Ministry of Education, Culture, Sports, Science and Technology-Japan 2010). Additionally, English language competency can affect the work of future dental educators and researchers (Morse & Nakahara 2001) so that developing such ability is important. It is essential, therefore, to provide practical experience to undergraduates to allow them to develop these competencies and prepare them for their future careers. Furthermore, previous research on Japanese medical doctors has found that the experience of living abroad was more highly related with seeing greater numbers of foreign patients than was exposure to English-language research articles (Tamamaki & Nishio 2013). Although one purpose of dental schools is to foster dental professionals who provide care in local communities, we need to focus on the condition of future society in the era of globalization. Thus, exposing dental students to English lectures by scientists on their research topics is one way to both motivate and prepare students.

To this end, in 2014, Hiroshima University School of Dentistry established an undergraduate videoconferencing class with eight lectures on research topics with two sister dental schools in Asia. The class was expected to be an opportunity for students to learn about cutting-edge discoveries or advanced research topics and to motivate each other by sharing lectures. The lectures took place in the lecture rooms of three dental schools (Hiroshima University, Japan; Airlangga University, Indonesia; University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam) and videoconferencing was used to broadcast live lectures on topics of clinical dental research or basic bio science research to undergraduate students of the three dental schools. The lecturers were from the three dental schools mentioned as well as one other university. Generally, distance learning is understood as taking place when a teacher and student(s) are separated by physical distance, and technology is used to bridge the gap (Wills 1993). However, in this class, almost all the lectures were broadcast from a classroom in one of the three schools, mainly Hiroshima University. Following the implementation of these lectures, in this study, we sought to examine students’ opinions on sharing their lectures with students in foreign countries and how they, the students in Japan, are impacted by this practice.

The purpose of this study was to examine the Japanese students’ views of international videoconferencing lectures to provide insights into how to better integrate this technology into university dental education.

**Methods**

All students who attended the videoconferencing lectures were invited to the study. All of them were over age 18 and given an oral explanation of the purpose and methods involved in the study. Also, the students were explained that questionnaire submission shall be deemed to consent for this study. The questionnaires were all self-administered, unlinkable-anonymized, and collected immediately after completion. The study was performed in accordance with the World Medical Association Declaration of Helsinki, and the experimental protocol and consent procedure were approved by the ethics committee of Hiroshima University (Epi-1093) before commencement of the study.

In 2015 and 2016, we conducted eight videoconferencing lectures, five from Japan, one from Indonesia, one from
Vietnam, and one from the United Kingdom. The lecture topics covered areas of the clinical scientific research of the eight lecturers. The lectures were given to fifth-year students at Hiroshima University with the required credits, undergraduate students at Airlangga University, and undergraduate students at University of Medicine and Pharmacy at Ho Chi Minh City as optional lectures. Each lecture was limited to sixty minutes, including a discussion, as long lectures can affect students negatively (Karal et al. 2011; Koppelman & Vranken 2008), and we needed to manage the time differences and class schedules of three different schools.

After completing the lecture series, a questionnaire was distributed to the students of the three dental schools. The questionnaire was self-administered and anonymous, and consisted of three sections. The first section asked students for their views on the videoconferencing class. In this section, using a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), students evaluated the videoconferencing lecture based on 14 questions. The second section asked about their English conversation skills ("How well can you speak English?": "I can speak sufficiently for daily life or business" (1), "I can manage to make myself understood for daily life or business purposes" (2), "I can ask for directions or order at restaurants" (3), "I can greet people" (4), "I can hardly speak English at all" (5)) and their reading comprehension skills ("How well can you read English?": "I can read English books and newspapers without trouble" (1), "I can read English books and newspapers" (2), "I can read short sentences in English" (3), "I can understand easy words" (4), "I can hardly read English at all" (5)) (Japanese General Social Surveys 2002, 2006). The third section asked for their comments on the videoconferencing class or future improvement.

We used the results from senior students (fourth- and fifth-year students) in Japan and Indonesia who had participated in the videoconferencing lectures in 2015 and 2016. Results were gathered from 248 senior undergraduate dental students (86 Japanese students, 162 Indonesian students). Tests were performed to determine the associations between the answers and location of the school (with ratings from 1 to 3 considered to mean negative/no and 4 to 5 considered to mean positive/yes for Q1-8 and Q10-14; and ratings from 3 to 5 considered to be negative/yes and 1 to 2 considered to be positive/no for Q9). Regarding English skills, we divided the students into two groups with ratings from 3 to 5 considered to be low English proficiency and 1 to 2 considered to be high English proficiency. R (The R Foundation for Statistical Computing, Vienna, Austria) was used for the Fisher’s exact test, while SPSS Statistics version 21 (IBM Japan, Tokyo) was used for the other statistical analyses.

The results for the two groups regarding the fourteen questions were compared using a chi-square test or Fisher’s exact test. A P value of <.05 was considered statistically significant. The results of the Japanese students were also tested using principal components analysis (PCA). Since the PCA output results in a large number of factor solutions, for each factor, factor loadings of | ≥ 0.3 | were considered to contribute significantly to the pattern and were used to calculate factor scores. Factor scores were calculated as the average of the question’s score for each component. Ward’s hierarchical clustering method was conducted.

In the third section, the survey comments were analyzed according to the Steps for Coding and Theorization method (SCAT) (Otani 2007), a sequential and thematic qualitative data analysis technique that consists of coding steps from open to selective, a storyline writing using the final selective codes, and writing theories from the storyline. Finally, we identified the perceptions reported by Japanese dental students.

Results

The response rate of Japanese students was 93.48%, while that of Indonesian students was 92.57%. No significant relations were found between schools and the answers to the following three questions: "I was stimulated by the attitude of the foreign dental students" (Q7), "The science concepts were too difficult for me to understand" (Q9),
and "I could follow the slides easily during the lecture even through the videoconferencing system" (Q13). On the other hand, there were significant differences between the schools and the answers to the other eleven questions (Table 1). Moreover, there were significant differences between the Japanese and Indonesian students on the self-evaluation of English conversation skills and reading comprehension (Table 2).

The answers of Japanese students were divided into four main components using the PCA with the contribution rate 69.27% (Table 3a). Based on the average score of the four components, we divided the Japanese students into six clusters (Cs1-Cs6). The six clusters characterized with Component 1 (C1: general evaluation), Component 3 (C3: understanding of the lectures), Q5 (engagement in the discussion section), Q7 (motivation from foreign students), Q14 (listening to the lecturers' English), English abilities, and the results of the SCAT (Table 4). Groups Cs1 and Cs2 had the highest general evaluation of the videoconferencing lectures. Both groups positively evaluated the points in relation to listening to the lecturers' English, content understanding, and motivation from foreign students. However, Cs1 also positively evaluated the class discussion, while Cs2 did not.

Groups Cs3, Cs4, and Cs5 gave generally low evaluations of the videoconferencing lectures. They were interested in the lecture topics, although they could not understand everything. Some sample comments from these groups include the following:

"It was interesting to learn the topics from clinical and research viewpoints. It was also a good chance to learn English explanations and terms" (Student 13, Cs3).

"I could understand more clearly if the Japanese and international lecturers both spoke more slowly" (Student 60, Cs4).

"Although I was excited with the modern style class, it was a little bit tough for me because the topics were advanced and the language was English only" (Student 92, Cs5).

Group Cs6 gave the lowest overall evaluation of the videoconferencing lectures. Unlike Cs5, many of the students in Cs6 did not pay attention to the foreign students via the videoconferencing and were completely dissatisfied with the class.

"I gave up listening to the lectures because I could not understand, although some topics looked interesting to me" (Student 34; Cs6).

"I want to discuss directly in a small group more than have video teleconference lectures" (Student 32; Cs6).

Discussion

Our results showed that half of the Japanese and Indonesian students reported being motivated by foreign dental students via the videoconferencing class. On the other hand, many felt that the science concepts in the lectures were too difficult for them to understand (Table 1). More than 60% of each country's students negatively evaluated the sound quality or video connection because of Internet problems. In some previous studies, the applied technologies, the locations of the devices, technical problems related to sound, image, and connection, the interaction inside and outside of the class, the teachers' use of body language, and the duration of courses were identified as factors affecting student perspectives on distance education (Martin 2005; Koppelman & Vranken 2008; Gillies 2008; Marsh 2010). Before the class in 2015, we conducted two undergraduate classes to share the research topic lectures with undergraduate students from the same dental schools. From this experience, we were able to assess and modify
the difficulty level of the lectures, the language spoken (i.e., Japanese and English to English only), and provided summary books with lecturers’ information (photos and abstracts) and mini-quizzes before the lectures to support the students’ learning. Despite these improvements, the difficulty level and Internet connection continued to be common concerns for both the Japanese and Indonesian students in this study. In addition, the Japanese students tended to answer questions on the lectures more negatively than Indonesian students (Table 1). Thus, we sought to understand why this was the case.

Based on the results of the cluster analysis and SCAT, Japanese students in Cs1-Cs5 (67.44%) were interested in some aspect of the lectures, such as international connections and research topics. The lectures were conducted in an omnibus style by eight different lecturers, so there were various topics to appeal to students’ varied interests. Moreover, the videoconferencing lectures provided variety to the Japanese students during their regular program. It was also observed that the students liked the educational environments in which the new technologies were used (Martin 2005; Marsh et al 2010).

Previous research has shown that students have positive expectations for videoconferencing classes, related to experiencing a new educational method (Karal et al. 2011). However, in this study, many of the lectures were given from the Japanese students’ own classroom in Japan and thus the students in Japan had fewer opportunities to meet new lecturers during the videoconferencing class. Moreover, it is well-known that the locations of devices in the class environment are important for students (Karal et al. 2011). The researchers observed that many lecturers, not only in Japan but also in other countries, tended to pay attention to the videoconferencing rather than the students in their real classrooms. As a result, the Japanese students reported that they rarely felt the lecturers’ attention during class time (Table 1, Q10) and that they had less interaction with the lecturer than in regular classes. It is believed that these conditions negatively affected the Japanese students’ perspectives of the videoconferencing lectures, more so than the Indonesian students.

Interestingly, the high general evaluation groups (Cs1 and Cs2) reported that they could understand both the lecturers’ English and lecture contents. Because of their low self-evaluation of English conversation skills, many students in Cs2 reported low cooperation in the discussion and difficulty listening to the lectures. On the other hand, almost all students in Cs3 and Cs4 reported that they could not sufficiently understand the lecturers’ English, despite being interested in the lecture contents. Cs3 students’ English reading ability was sufficient to understand the reading materials. Cs3 Japanese students reported that they understood the contents by using the slides/handouts. However, this shows that some students did not pay attention to the lectures themselves, meaning that they were not engaged. One student commented, "I need handouts in Japanese at least" (Student 71, Cs4). From this, it is suggested that English listening ability or providing devices to overcome language barriers are important to enable participants to follow the lectures.

When participants’ expectations cannot be met adequately, student perceptions and learning are affected. This is important, as perceptions have been described as one of the determinants for the development of knowledge (Karal et al. 2011). In the present study, many of the students in Japan self-evaluated their own English abilities as low (Table 2). When comparing TOEFL-iBT scores among Asian countries, Japan was ranked twenty-seventh and Indonesia eighth among thirty countries (Educational Testing Service 2016). It is possible that English ability was one of the reasons for the low general impression of the students in Japan of the videoconferencing lectures. However, we did not find any significant relations between the Japanese students’ English abilities and their understanding of the lecturers’ English (Q14) among all of the participants (data not shown). It is thus clear that English listening comprehension skills (with a self-evaluation level of at least "I can speak sufficiently for daily life or business” or "I can manage to make myself understood for daily life or business purposes”) is a requirement for students to independently engage in an English lecture-style class via videoconferencing.
It is also suggested that synchronous interaction might support student adaptation to distance learning. Some of the students in Cs6 reported that it would be better to have more small-group communication. Previous research has shown that small group discussion is helpful and facilitates student interaction via videoconferencing (Basiliko & Gupta 2015; Davies et al 2012). It has also been reported that small group videoconferencing lectures delivered both in person and remotely between different countries can transfer knowledge (Kiwanuka et al. 2015). There is thus the potential to improve the effectiveness of international videoconferencing lectures by applying small group learning that extends beyond the boundaries of the school or country. It is believed that these conditions affect student adaptation to videoconferencing lectures.

This study has a number of limitations. Our questionnaire asked participants for their general views and comments on the videoconferencing lectures based on their experiences throughout the class periods, but we did not explore the possible impact of the lecturers. Moreover, regarding the comparison of results between Japan and Indonesia, we did not measure the effect of cultural background. In this study, we chose to only use the results of senior students (fifth-year Japanese students in a six-year program and fourth-year Indonesian students in a five-year program) to avoid any discrepancies in general academic knowledge in dentistry. Although we also shared the videoconferencing with dental students in Vietnam, the size of their classroom was smaller than in the other two schools and they comprised a random mix of senior and junior students in some lectures. Although Hiroshima University had advanced research course students in the class, the lecturers set the difficulty level of the class to a general level in response to past experiences. However, we did not clarify the research knowledge base of the students in the present study. Regarding student English abilities, we did not use objective scales or other basic abilities/backgrounds. It has been reported that the listening comprehension of Japanese learners with good short-term memory is significantly better than that of poor short-term memory learners (Takeno & Takatsuka 2007). It would also be useful to conduct a qualitative analysis to obtain more specific information on the lectures.

**Conclusion**

Furthermore, we need to consider and share information about the value of videoconferencing for each connected classroom when arranging collaborative classes. Further research is also required to discover the full potential of international videoconferencing lectures, and how classrooms can collaborate and connect with each other to improve university dental education globally. The results of this survey suggest that many Japanese undergraduate dental students were motivated by the videoconferencing lectures with various research topics. Although some students were convinced of the usefulness and benefits of this innovative learning approach through videoconferencing lectures, many did not utilize the lectures effectively. Overcoming the barriers of insufficient English abilities among the participants, connection troubles, and less communication with lecturers and participants would improve the experience of the Japanese students in attending videoconferencing lectures.

**Take Home Messages**

- International videoconferencing lectures on basic/clinical research serve global classrooms by connecting researchers and students from different locations.
- Overcoming the barriers of insufficient English abilities among the Japanese participants and increasing the interaction with lecturers could serve more effective videoconferencing lectures.
- Further studies will provide additional insights into potential of global collaboration using informative technology on education of medical professions.
Notes On Contributors

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Appendices
| Q    | Statement                                                                 | Japan | Indonesia | Total | P-value |
|------|---------------------------------------------------------------------------|-------|-----------|-------|---------|
| Q1   | I am willing to participate in this video conference lectures.            | Yes   | 16        | 136   | 149     | 0.000   |
|      |                                                                           | No    | 73        | 26    | 99      |         |
| Q2   | I could find some benefits for me when attend video conference lectures this time. | Yes   | 11        | 126   | 137     | 0.000   |
|      |                                                                           | No    | 69        | 36    | 105     |         |
| Q3   | I could learn new dental topics.                                         | Yes   | 28        | 138   | 166     | 0.000   |
|      |                                                                           | No    | 55        | 23    | 78      |         |
| Q4   | Even if I already knew some of the topics, I could learn the topics from different viewpoints. | Yes   | 27        | 119   | 146     | 0.000   |
|      |                                                                           | No    | 57        | 41    | 98      |         |
| Q5   | The students were involved in discussions.                               | Yes   | 8         | 68    | 76      | 0.000   |
|      |                                                                           | No    | 74        | 93    | 167     |         |
| Q6   | The contents were exciting and changeable.                               | Yes   | 18        | 93    | 111     | 0.000   |
|      |                                                                           | No    | 65        | 66    | 131     |         |
| Q7   | I was stimulated by the attitude of foreign dental students.             | Yes   | 43        | 96    | 139     | 0.279   |
|      |                                                                           | No    | 40        | 66    | 106     |         |
| Q8   | I could receive many opinions/ ideas from different viewpoints for one topics | Yes   | 24        | 114   | 138     | 0.000   |
|      |                                                                           | No    | 55        | 48    | 103     |         |
| Q9   | The science concepts were too difficult for me to understand.            | Yes   | 63        | 140   | 203     | 0.183   |
|      |                                                                           | No    | 16        | 21    | 37      |         |
| Q10  | The lecturers paid attention to students.                                 | Yes   | 17        | 117   | 134     | 0.000   |
|      |                                                                           | No    | 66        | 44    | 110     |         |
| Q11  | We could learn new science concepts                                      | Yes   | 39        | 139   | 178     | 0.000   |
|      |                                                                           | No    | 43        | 23    | 66      |         |
| Q12  | The sound through video conference system is perfect to listen            | Yes   | 32        | 41    | 73      | 0.041   |
|      |                                                                           | No    | 52        | 121   | 173     |         |
| Q13  | I could follow the slides smoothly during the lecture even through video conference system. | Yes   | 33        | 69    | 102     | 0.784   |
|      |                                                                           | No    | 48        | 92    | 140     |         |
| Q14  | I could understand lecturers' English even through video conference system. | Yes   | 15        | 52    | 67      | 0.033   |
|      |                                                                           | No    | 65        | 110   | 175     |         |
Table 1. Views of dental students on international videoconferencing lectures on various research topics

Chi-square test or Fisher’s exact test. Q1-8, Q10-14: Yes = scores of 4 to 5; No = scores of 1 to 3. Q9: Yes = scores of 3 to 5; No = scores of 1 to 2.

| Table 2 |
|---|---|---|---|---|
| Conversation | Japan | Indonesia | Total | P-value |
| Low | 65 | 39 | 104 | |
| High | 18 | 122 | 140 | |
| N/A | 3 | 1 | 4 | 0.000 |
| Reading | Japan | Indonesia | Total | P-value |
| Low | 36 | 38 | 74 | |
| High | 48 | 124 | 172 | |
| N/A | 2 | 0 | 2 | 0.003 |

Table 2. Self-evaluation of English abilities (n=248)
### Table 3a

|                  | Components |
|------------------|------------|
|                  | C1  | C2  | C3  | C4  |
| Q4               | 0.835| 0.11| -0.045| -0.06|
| Q6               | 0.824| -0.124| -0.273| -0.145|
| Q2               | 0.819| -0.032| -0.161| 0.101|
| Q3               | 0.807| 0.129| 0.004| 0.099|
| Q8               | 0.794| -0.153| 0.119| 0.007|
| Q1               | 0.792| 0.04| 0.185| -0.053|
| Q11              | 0.672| 0.291| 0.098| 0.157|
| Q14              | 0.668| -0.314| 0.051| 0.091|
| Q10              | 0.551| 0.389| 0.342| 0.063|
| Q7               | 0.506| 0.369| 0.083| -0.513|
| Q13              | 0.389| -0.699| 0.192| -0.092|
| Q5               | 0.223| 0.143| -0.346| 0.806|
| Q12              | -0.024| -0.471| 0.735| 0.263|
| Q9               | -0.257| 0.531| 0.622| 0.14|
| Contribution ratio | 40.571| 11.094| 9.975| 7.811|

### Table 3b

| C1  | General evaluation                               |
|-----|--------------------------------------------------|
| C2  | Atmosphere and condition of the class            |
| C3  | Understanding for the lectures (as an audience)  |
| C4  | Participation of the students in the discussion  |

Table 3. Components of the responses (Q1-Q14) from dental students in Japan

a. Principal components analysis (PCA), Ward's hierarchical clustering method
b. Labels of the components
Table 4

| Cluster (Cs) | %   | C1 | C3 | Q5 | Q7 | Q14 | High English abilities (%) | SCAT                                                                                     |
|-------------|-----|----|----|----|----|-----|-----------------------------|-----------------------------------------------------------------------------------------|
| Cs1         | 5.81| High | High | + | + | +   | 40.00 | 60.00 | The students adopted the class style and engaged actively/positively. |
| Cs2         | 8.14| High | High | - | + | +   | 0.00  | 57.14 | The students attended and listened the lectures like an audience. Some of them expected more lectures from abroad. |
| Cs3         | 13.9| Low  | High | - | - | +   | 16.67 | 91.68 | Although the students have interests in the topics and foreign dental schools, they didn't adapt the lecture style enough. English Reading skill is enough. |
| Cs4         | 8.14| Low  | High | - | + | -   | 14.29 | 28.57 | Although the students had interests in the topics, they had language problems. |
| Cs5         | 31.40| Low | ±  | - | + | -   | 25.93 | 48.15 | The students were interested in the projects and foreign schools/students. However, they didn't understand lectures. |
| Cs6         | 31.40| Low | ±  | - | - | -   | 22.22 | 55.56 | The students were dissatisfied with the class or the lecture style in all English. |

Total 86 Japanese students (No answer: 1 student).

- **High/+**: % of the students ≥ 60.0
- **±**: 40.0 < % of the students < 60.0
- **Low/-**: % of the students ≤ 40.0

C1 (Component 1): Average score >0.5
C3 (Component 3): G9 or Q10 or Q12; Positive
Q5: Engagement to discussion part; Yes
Q7: Motivation by foreign students; Yes
Q14: Listening of lecturers’ English; Yes
C: Conversation
R: Reading

Table 4. Characteristics of the six clusters (Cs1-Cs6)

Total: 86 Japanese students (No answer: 1 student).

High/+; % of students ≥ 60.0, ±; 40.0 < % of students < 60.0, Low/-; % of students ≤ 40.0.
Declaration of Interest

The author has declared that there are no conflicts of interest.