Teaching critical thinking and cultural intelligence via virtual exchange: a practice report on the utilization of research-based principles to support and assess learning outcomes

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Abstract

While it is appealing to consider the potential benefits of incorporating virtual exchange and other technology-based tools when designing a learning experience, it is irresponsible to assume that technology in-and-of itself has the power to improve learning outcomes. Research-supported pedagogy and theory must form the basis of any attempt to incorporate virtual exchange into a learning activity. This paper presents a detailed examination of an undergraduate liberal arts course built on research-supported theories and practices to support learning outcomes, including collaborative cognitive load theory, the cognitive theory of multimedia learning, and instruction based on self-explanation and self-reflection. Initial assessment of the course suggests success in achieving learning outcomes related to critical thinking and intercultural discourse but highlights the need for objective data to support these claims. As virtual exchange gains momentum, it is necessary to continually assess and improve its utilization to guarantee its educational value.

Keywords: higher education; critical thinking; collaborative online international learning; cultural intelligence; international communication.

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1.   Introduction

Collaborative online international learning and other variants of virtual exchange are gaining momentum as higher education institutions worldwide continue to cope with the challenges of facilitating international education opportunities and addressing restricted student mobility during the COVID-19 pandemic. To ensure the quality of educational opportunities provided to students by these means, it is vital for educators to consider how pedagogy and theory can be utilized to support target learning outcomes. As Mayer (2019) states in his review of three decades of research on online learning, "online venues allow for many innovative approaches to support learning; but what is needed are research-based principles for how best to take advantage of these new possibilities" (p. 152).

This practice report presents a detailed examination of an undergraduate liberal arts course at a university in Japan which utilized virtual exchange to structure a learning experience grounded in the cognitive theory of multimedia learning (Mayer, 2014) and collaborative cognitive load theory (Kirschner, Sweller, Kirschner, & Zambrano, 2018). Within this theoretical framework, relevant pedagogies supported by research on instruction were used to support learning, most prevalently instructional methods based on self-explanation (Rittle-Johnson & Loehr, 2017) and self-reflection (Veenman, 2017).

Readers will gain insight into the practical application and evaluation of these research-based principles for virtual exchange design and implementation, as well as their effectiveness in supporting learning objectives related to critical thinking and cultural intelligence.

2.   Context and rationale

Before the COVID-19 pandemic, the Japanese education ministry had spent trillions of yen (over eight million dollars) funding over a decade of large-scale initiatives designed to internationalize higher education in institutions across the country (Rose & McKinley, 2018). Despite a lack of research evaluating the impact of such initiatives, the practice has continued with the most recent Top Global University Project (TGUP), which aims at enhancing international competitiveness and compatibility by endorsing specific goals as performance indicators (see Table 1) to which funded universities should comply (MEXT, n.d.).

The university in Japan is one of 37 institutions selected by the education ministry for funding under the TGUP initiative. The educational experience presented in this paper was intentionally

designed to align with both those performance indicators, as well as the institutional philosophy of the host university regarding international education. This philosophy promotes four targets: an international and multidisciplinary education delivered in English; a global atmosphere for the inclusion of international students; strengthened and globalized graduate education to support research; and international educational outreach with the local community.

Table 1. Main performance indicators as outlined by the Japanese Ministry of Education

No.	Goal
1	Increase the number of full-time foreign faculty and Japanese faculty who received their degrees from foreign universities
2	Increase the ratio of international students in the total student population
3	Increase the ratio of students who have earned credits at foreign universities in the total Japanese student population
4	Increase the number of students sent abroad under inter-university agreements
5	Increase the number of subjects taught in foreign languages
6	Increase the number of students enrolled in degree courses conducted in foreign languages only
7	Increase the number of students who meet the standards of proficiency in foreign languages
8	Develop English syllabi
9	Increase the number of Japanese students living in international dormitories
10	Adopt a flexible academic calendar (Introduce a quarter system on a university-wide basis)

Note. Adapted from MEXT (n.d.).

Regarding online student collaboration, research into collaborative cognitive load theory suggests that such activities can be beneficial if students are able to obtain information from each other that would be difficult to obtain from other sources (Kirschner et al., 2018). Moreover, research specifically into collaborative online international learning suggests that it may support learning outcomes related to critical thinking and cultural intelligence (see Byram & Wagner, 2018; O'Dowd, 2019; Rubin & Guth, 2015). Thus, the decision to use the collaborative online international learning strategy was made upon the argument that, with appropriate guidance and support to reduce extraneous cognitive load, collaborating students could share unique perspectives to "create a collective working memory whereby a mutually shared cognition is achieved" (Kirschner et al., 2018, p. 220).

The virtual exchange program was conducted for eight weeks, combining 'Contemporary Socio-Cultural Topics', a course taught at the university in Japan, with 'Contemporary Global Issues', taught at the partner university in the US. Both courses, as well as the virtual exchange activities, were held in English. Twenty students from Japan and 35 from the US joined the collaboration, divided at

random into nine groups of six to seven students each. The collaboration was designed and executed by one faculty from each respective institution, as well as an instructional design expert employed by the US institution.

Moodle was utilized at the university in Japan as the learning management system to structure the online class, and FlipGrid was used as a medium for video-based, asynchronous student collaboration and discussion.

3.   Instructional design

3.1.   Structure

The eight-week collaboration was segmented into four two-week asynchronous sessions, each with a different pandemic-related topic for learning and discussion. These topics included personal experience and impact, impact on education, government policy, and wearing masks. The short time frame and unfamiliarity among participating students presented a challenge in increasing extraneous cognitive load related to collaboration processes (Kirschner et al., 2018). Care was taken, therefore, to provide students with explicit guidance and support to reduce the extraneous cognitive load associated with such processes. Scaffolding was provided in both Internet-based learning management systems as well as independent preparation and debriefing sessions.

3.2.   Learning objectives

3.2.1.   Critical thinking

The learning objectives related to critical thinking in this course were specified as "making conclusions from available facts, seeing both sides of an issue, being open to new perspectives" (Willingham, 2007, p. 9). Despite being a common target for learning achievement, decades of cognitive research indicate that "critical thinking cannot be taught as a skill which can be readily applied to different situations and contexts" (Willingham, 2007, p. 17). The processes of thinking are "inextricable from the content of thought", thus prior knowledge about a topic is a prerequisite for any kind of critical thinking to occur (Willingham, 2007, p. 8). While it is difficult to teach students to think critically, Willingham (2007) suggests that metacognitive strategies (e.g. thinking scientifically) combined with domain knowledge and practice can help students to develop the ability to think critically. Therefore, the learning experience in which the students of this course were engaged began by developing background knowledge by viewing digital learning content (see Appendix,

Figure 1) related to their discussion topics, then prompting students to make connections with their own personal experiences.

The importance of background knowledge is also highlighted in a critical review of its role in reading comprehension by Smith, Snow, Serry, and Hammond (2021), who point to research indicating that weaker readers – in the case of this project, English language learners – rely on background knowledge to compensate for their weaker reading ability. Guided review and discussion were therefore conducted during supplemental online meetings between the Japanese students and their instructor to further develop a background knowledge base for the Japanese students.

Upon building a foundation of prior knowledge, Japanese students were then tasked to think scientifically. To accomplish this, research questions were first submitted by Japanese students to their teacher based on prior knowledge and individual interest. Japanese students then developed hypotheses, gathered information from their collaborative discussions, and interpreted their results through self-explanation. Self-explanation is a learning method supported by strong evidence for improving comprehension and transfer in a variety of contexts (Rittle-Johnson & Loehr, 2017). Through scientific analysis, students were expected to infer meaning beyond the available information to explain why their hypotheses were or were not accurate.

Care was taken to inform students that the accuracy of their interpretations was potentially compromised by limitations including bias and conditional probability. The focus for learning, instead, was placed on the importance of using this cognitive strategy to critically interpret information obtained from text and peer discussion.

3.2.2. Cultural intelligence

Cultural intelligence (CQ) is defined by Ang and Van Dyne (2015) as "the capability of an individual to function effectively in situations characterized by cultural diversity" (p. 3). Their model for cultural intelligence is based on Sternberg and Detterman's (1986) theoretical framework of individual-level intelligence and consists of four capabilities: "metacognition, cognition, motivation, and behavior" (Ang & Van Dyne, 2015, pp. 5-6; see Table 2).

Table 2. Capabilities for cultural intelligence

Capability	Description
Metacognitive CQ	An individual's level of conscious cultural awareness during cross-cultural interactions
Cognitive CQ	Knowledge of norms, practices, and conventions in different cultures

Motivational CQ	The capability to direct attention and energy toward learning about and functioning in situations characterized by cultural differences
Behavioral CQ	Verbal and nonverbal social interaction

Note. Adapted from Earley and Ang (2003).

The empirical evidence for using the cultural intelligence framework to measure intercultural competence was first published by Ang et al. in 2007. Since then, the breadth of peer-reviewed research related to CQ has extended to over a hundred academic journals (Livermore & Soon, 2015). In a review of methods for assessing cross-cultural competence, Matsumoto and Hwang (2013) indicate that cultural intelligence can predict an individual's performance in areas including "decision making, problem solving, adaptability, innovation, team performance, and trust building" (p. 856).

Strategies for developing cultural intelligence are constructivist in nature because they emphasize student-centered experiences and exercises in metacognition (Livermore & Soon, 2015). After each discussion activity throughout the course, Japanese students were tasked with reflecting on the four capabilities of cultural intelligence as they related to the discussion experience. Research indicates that such reflection activities can promote self-regulation and metacognition, both of which are important indicators of learning performance (Veenman, 2017). It should be noted that Veenman (2017) cautions that students should be prompted during self-reflection activities which take place retrospectively to avoid the risk of false or exaggerated recollection. In this course, students were prompted by video recordings of their communication activities with international peers.

4.   Implementation

4.1.   Preparation

Prior to student discussion, preparation activities were conducted to build background knowledge, create research questions, and develop hypotheses. The design of these preparation activities was based on Mayer's (2019) three instructional goals for online learning, which were derived from cognitive load theory (Paas & Sweller, 2014) and the cognitive theory of multimedia learning (Mayer, 2014). These goals include (a) "reducing extraneous processing" by eliminating information that is irrelevant to the learning objective, (b) "managing essential processing" by scaffolding material so that learners may process it easily, and (c) "fostering generative processing" by allowing the learner to build a mental model by integrating relevant prior knowledge (Mayer, 2019, p. 155).

Throughout the course, all information and instructions were detailed on Moodle. Initial information provided to students was presented through various media including online news articles and videos. After viewing the learning content, students were encouraged to engage in generative processing first by responding to prompts designed to connect their prior knowledge with information presented in the learning material, and then by using those responses to create research questions and hypotheses. With this preparation complete, students then began participating in asynchronous discussion with their international peers.

4.2. Peer discussion

As previously mentioned, students from each university were distributed to nine smaller groups of six to seven students each to facilitate discussion. The purpose of this division was to simplify student discussion (see Kirschner et al., 2018) and place greater importance on individual participation, thereby mitigating what Karau and Williams's (1993) term social loafing, or the tendency of students working in a group to expend less effort than they would if working individually. To further clarify the collaboration process, students were given explicit instructions on what their responsibilities were for discussion, and how those responsibilities were reflected in the grading rubric (see Appendix, Figure 2).

The discussions were conducted on FlipGrid, an Internet-based application chosen specifically because it allows for asynchronous video discussion – a necessity due to the large time difference between participating students. More importantly, FlipGrid provides unlimited access to digital video records of student exchanges. This was an invaluable resource for students, who were able to use these videos for prompting their self-reflection activities. Moreover, unlimited access to these videos potentially provided an outlet for cognitive offloading, thereby freeing up working memory for discussion (Kirschner et al., 2018). This was perhaps particularly beneficial for students whose primary language was not English, as the need to process and respond to information in a foreign language results in a greater cognitive load (Mayer, Lee, & Peebles, 2014). For instructors, the digital video record provided a means by which to more accurately analyze the discussions to evaluate student learning outcomes as well as the effectiveness of their own pedagogical practices.

4.3. Assessment

Upon the completion of all discussion activities, students individually submitted a self-reflection essay addressing their experiences throughout the course and perceived learning outcomes related to critical thinking and cultural intelligence. For this exercise, students were prompted by their discussion reflection notes from each session, as well as the digital video record kept on FlipGrid.

The subjective evidence obtained from the self-reflection activities conducted throughout the course suggest that most students perceived a positive impact on both their critical thinking abilities as well as their cultural intelligence. Objective evidence is limited to the video record of student discussion, which could be closely analyzed to determine how students applied scientific thinking strategies and cultural intelligence techniques during their communication. However, the accuracy of such analysis is severely limited by the short time frame in which these interactions took place. Moreover, the variability in linguistic ability and relationships between students of different groups likely had an influence on the ease by which discussions took place.

5. Evaluation

Overall, the responses from students during debriefing and self-reflection activities suggest that the learning experience was successful in achieving its goals of supporting critical thinking and cultural intelligence (for an example see Appendix, Figure 3). However, the lack of objective data to support these claims highlights methodological problems that need to be addressed. These problems are similar among other programs which have tried to teach critical thinking skills (see Willingham, 2007). First, the evaluation of students' critical thinking and cultural intelligence skills ends with completion of the course, so there is no way to know if these skills persist beyond the scope of the course, or if they can be transferred to other contexts. Furthermore, the context of the self-assessment questions themselves may have prompted students to answer untruthfully. After all, students were aware that the goal of the course was to improve their critical thinking and cultural intelligence abilities, and that they would be evaluated based on their reflection statements.

On closer examination of student interactions and group dynamics, it is clear that team characteristics are an important feature of online student collaboration (Kirschner et al., 2018). While team size and clear roles for each individual were addressed in this course, there was not enough time to build a collaborative foundation based on previous task or team experience, as is recommended by Kirschner et al. (2018) for reducing extraneous cognitive load. The time limitation of eight weeks results from the policy by which the Japanese university structures its courses, and so is not easily extended. While pursuing a change in this policy may be daunting, it is also important to consider for the effectiveness of future online collaborations.

Another important consideration relates to the characteristics of communication by English language learners. Willingness to communicate has been studied extensively as a factor of successful communication for students using English as a Foreign Language (EFL, Yashima,

Zenuk-Nishide, & Shimizu, 2004). Yashima et al. (2004) present correlational analyses showing that perceived communication competence is important for an individual's willingness to communicate, and that a high willingness to initiate discussion might result in a greater level of reciprocal communication between L1 and L2 students. This is relevant to Japanese students because entrance examinations to higher education institutions in Japan focus primarily on English grammar and translation, with little attention paid to written communication, and none at all to spoken communication. The content of these examinations largely influences the EFL curriculum at Japanese junior and senior high schools, which tend to focus on rote memorization and translation abilities (Gorsuch, 2000).

The resulting lack of opportunities for Japanese students to use English for spoken communication thus potentially has a negative influence on their perceived communication competence, and so on their willingness to communicate in English with their international peers. It should be noted, however, that Yashima et al. (2004) also indicate that an interest in international affairs seems to positively influence students' willingness to communicate in a foreign language and voluntarily engage in communication more frequently. The Japanese students who participated in this course potentially fit this description, as their choice to join the collaboration is indicative of their interest in international affairs. Through future international collaboration and discussion activities such as the one outlined in this paper, it is hoped that students participating from Japan can gain valuable experience for using English to share ideas in an international environment, and so increase their perceived communicative competence.

6.   Future directions

With the increased interest and investment in collaborative online international learning currently seen in universities throughout Japan, it is important to continue assessing and improving the implementation of such programs to guarantee their educational value in lieu of, or in combination with, international learning curricula including study abroad programs which have been restricted during the pandemic. Objective data is necessary for more accurate assessments of the impacts which collaborative international online learning potentially has on critical thinking and cultural intelligence. One potential source of objective data is frequently seen in research on cultural intelligence, where a widely used and cited cultural intelligence scale provides opportunities for student assessment before and after international learning projects (Ang et al., 2007). Assessment of critical thinking remains problematic unless clear evidence can be shown of transfer to other contexts.

References

Ang, S., & Van Dyne, L. (2015). *Handbook of cultural intelligence: theory, measurement, and applications*. Routledge.

Ang, S., Van Dyne, L., Koh, C., Ng, K. Y., Templer, K. J., Tay, C., & Chandrasekar, N. A. (2007). Cultural intelligence: its measurement and effects on cultural judgment and decision making, cultural adaptation and task performance. *Management and organization review*, *3*(3), 335-371.

Byram, M., & Wagner, M. (2018). Making a difference: language teaching for intercultural and international dialogue. *Foreign Language Annals*, *51*(1), 140-151.

Earley, P. C., & Ang, S. (2003). Cultural intelligence: individual interactions across cultures.

Gorsuch, G. J. (2000). EFL educational policies and educational cultures: influences on teachers' approval of communicative activities. *TESOL quarterly*, *34*(4), 675-710.

Karau, S. J., & Williams, K. D. (1993). Social loafing: a meta-analytic review and theoretical integration. *Journal of personality and social psychology*, *65*(4), 681-706.

Kirschner, P. A., Sweller, J., Kirschner, F., & Zambrano, J. (2018). From cognitive load theory to collaborative cognitive load theory. *International Journal of Computer-Supported Collaborative Learning*, *13*(2), 213-233.

Livermore, D., & Soon, A. N. G. (2015). *Leading with cultural intelligence: the real secret to success*. Amacom.

Matsumoto, D., & Hwang, H. C. (2013). Assessing cross-cultural competence: a review of available tests. *Journal of cross-cultural psychology*, *44*(6), 849-873.

Mayer, R. E. (2014). Cognitive theory of multimedia learning. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (2nd ed., pp. 43-71). Cambridge University Press. https://doi.org/10.1017/CBO9781139547369.017

Mayer, R. E. (2019). Thirty years of research on online learning. *Applied Cognitive Psychology*, *33*(2), 152-159.

Mayer, R. E., Lee, H., & Peebles, A. (2014). Multimedia learning in a second language: a cognitive load perspective. *Applied Cognitive Psychology*, *28*(5), 653-660.

MEXT. (n.d.). *Top global university project. Top global university Japan.* Ministry of Education, Culture, Sports, Science and Technology. https://tgu.mext.go.jp/en/about/index.html

O'Dowd, R. (2019). A transnational model of virtual exchange for global citizenship education. *Language Teaching, 53*(4), 477-490.

Paas, F., & Sweller, J. (2014). Implications of cognitive load theory for multimedia learning. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (2nd ed., pp. 27-42). Cambridge University Press. https://doi.org/10.1017/CBO9781139547369.004

Rittle-Johnson, B., & Loehr, A. (2017). Instruction based on self-explanation. In R. E. Mayer & P. A. Alexander (Eds), *Handbook of research on learning and instruction* (2nd ed., pp. 349-364). Routledge.

Rose, H., & McKinley, J. (2018). Japan's English-medium instruction initiatives and the globalization of higher education. *Higher Education*, *75*(1), 111-129.

Rubin, J., & Guth, S. (2015). Collaborative online international learning. In A. Moore & S. Simon (Eds), *Globally networked teaching in the humanities* (pp. 14-27). Routledge.

Smith, R., Snow, P., Serry, T., & Hammond, L. (2021). The role of background knowledge in reading comprehension: a critical review. *Reading Psychology, 42*, 214-240.

Sternberg, R. J., & Detterman, D. K. (1986). *What is intelligence? Contemporary viewpoints on its nature and definition*. Ablex.

Veenman., M. (2017). Learning to self-monitor and self-regulate. In R. E. Mayer & P. A. Alexander (Eds), *Handbook of research on learning and instruction* (pp. 233-257). Routledge.

Willingham, D. T. (2007). Critical thinking: why it is so hard to teach? *American federation of teachers summer 2007* (pp. 8-19).

Yashima, T., Zenuk-Nishide, L., & Shimizu, K. (2004). The influence of attitudes and affect on willingness to communicate and second language communication. *Language learning, 54*(1), 119-152.

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Appendix

Figure 1

Multimedia Learning Content for Building Background Knowledge

The following sources were assigned to students prior to peer discussion.

Session	COVID-19 Theme	Multimedia Learning Content Link(s)
1	Personal Experience	(No multimedia content)
2	Impact on Education	Media link (International Labor Organization, 2020)
3	Government Policy	Media link 1 (World Health Organization, 2020a) Media link 2 (World Health Organization, 2020b) Media link 3 (World Health Organization, 2020c) Media link 4 (World Health Organization, 2020d)
4	Wearing Masks	Media link (Martin, 2020)

Figure 2

Grading Rubric

Assignments and Grading

#	Assignment	Details	Points
1	Hypotheses	Develop hypotheses regarding international perspectives on the topic	20
2	Peer Discussion	Present and discuss your hypotheses via asynchronous international video recordings (FlipGrid)	30
3	Reflection	Submit a short (200 words) reflection on the accuracy of your hypotheses	20
4	Final Essay	Essay describing the perceived impact of your discussions on critical thinking and cultural intelligence	30
Total Score			**100**

Figure 3

Examples of student responses

Critical Thinking Hypothesis: Based on the assigned readings and other media, what do you expect students in the U.S. will say about this topic?
<Student A> I expect that wearing masks is not popular because it is against freedom of lifestyle.
Reflection: Based on your discussion, was your hypothesis accurate? Why, or why not? Include specific examples to support your reason.
<Student A> I have heard that Americans refuse to wear masks in public, and I had been having the prejudice of it, but most of the American students in my groups were saying that people who don't wear masks in public places should be punished. I was very surprised to know that. The value to wear masks seems to have changed after the pandemic of corona virus.

Cultural Intelligence Reflection Excerpt
<Student B> There are many cultural differences and ways of thinking that are unique to a country that you cannot understand until you actually talk to them. You have to talk to them, listen to their opinions, and interact with them in various ways to understand them. For example, Japanese people tend to use what everyone else is doing to form their opinions, but Americans express their own opinions. Also, Japanese people tend to listen to the end of a conversation before giving their own opinion, while Americans will give their own opinion if they feel differently.