

## The relationship between intercultural development inventory, class reflection, and student condition among international university students in Japan

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### Abstract

Owing to globalization around the world, school education has shifted focus to accommodate international students. Meanwhile, the use of virtual worlds such as the Internet and social media have spread rapidly, allowing people to engage across borders; however, these are indirect experiences that affect the young people living in between. Consequently, intercultural communication skills are indispensable in this ever-changing society. The growing need for intercultural sensitivity cannot be ignored. This study focused on physical education (PE) skills among university students and their class contents, which can contribute significantly to communication skills. Additionally, the study aimed to clarify the relationship between intercultural sensitivity and class experiences of PE and examine their impact on physical and mental health. A total of 15 PE classes were conducted for 12 students between 2023 and 2024. The Intercultural Development Inventory (IDI) was used to evaluate IDI scores. Reflection sheets were used after each class to obtain responses on a five- and four-point scale for each aspect under physical condition (nutrition, emotions, physical health, and sleep) and class reflection (activeness, cooperation, enjoyment, refreshment, and skill), respectively. These values were then categorized into beginning, middle, and end of semester and used as indicators of class experience and physical and mental health. Furthermore, the number of class attendances was recorded. Correlation analysis was performed to clarify the relationship between each evaluation item. Higher IDI scores correlated to the frequency of attendance. The more positive the class reflections, the better the scores related to physical condition at the end of class.

**Keywords:** physical education, Intercultural Development Inventory, intercultural sensitivity, international students, cultural diversity

### Introduction

#### *Beginning of Research*

According to a study conducted in 2023, more than 70,000 international students attend Japanese universities. The accommodation of these diverse students is a growing concern. Although international students have a large impact on educational institutions, they also face various challenges (Mori, 2000; Smith & Khawaja, 2011; Wu et al., 2015). However, Japan does not yet have universities, teachers, teacher training programs, course contents, and other support systems in place to receive diverse students (Gollnick & Chinn, 1998; Mori, 2000; Rowan et al., 2021)

In a bid to help students address these challenges, some international schools and universities in Japan have made physical education mandatory for overseas students. Physical education can help with physical, practical, and emotional aspects, as well as improve social and cognitive abilities (Bailey, 2006). Thus, it is expected to contribute to the intercultural communication skills of international students in addition to their physical and mental health. However, Gollnick and Chinn (1998) report that many instructors unknowingly only give students from the mainstream culture the opportunity to speak up or be praised, which reduces opportunities for students from other cultures to listen or participate as well as to be criticized or punished. To resolve this, discriminatory ideas should be challenged and the way in which instructors engage with students should be evaluated frequently. Rowan et al. (2021) detail the long discussions conducted on the topic of teachers not having the preparation and confidence required to handle diverse learners.

Further, physical education classes in Japan attended by students from different cultures have been described as “difficult” in recent years (Izumo et al., 2007). Understanding how the class experience varies depending on intercultural communication skills, and how it affects students’ health, is crucial to conducting beneficial physical education classes for both instructors and students. However, no research has analyzed university physical education classes that employ Bennet’s (year) Intercultural Development Inventory (IDI). Therefore, the purpose of this study was to explain the relationship between intercultural sensitivity and class experiences in physical education and examine their impact on physical and mental health.

*What is intercultural sensitivity?*

Intercultural communication skills are essential for adapting to a rapidly changing world. It is key to successfully interacting with people from different cultural backgrounds (Chen & Starosta, 1997). Bronfenbrenner et al. (1958) presented an early study on the concept of sensitivity. They identified two types of sensitivity: sensitivity to the generalized other, and sensitivity to individual differences or interpersonal sensitivity. Sensitivity to the generalized other is a type of sensitivity to social norms of the group to which one belongs (McClelland, 1958), whereas interpersonal sensitivity is the ability to discern how the actions, perceptions, and feelings of others differ (Bronfenbrenner et al., 1958).

*Current Status of Previous Research*

Research on intercultural sensitivity has been conducted in various fields. Beginning with studies in Japan, they can be categorized into two major streams. First, research using the Intercultural Sensitivity Scale (ISS), presented by Chen and Starosta (2000). Hu and Ito (2023) used the ISS to study the relational mobility and intercultural sensitivity of Japanese students during the COVID-19 crisis. Interest in cross-cultural sensitivity increased in rapidly internationalizing medical institutions; the ISS has been used and validated in nursing schools (Hua et al., 2023). In 2016, Suzuki (2016) attempted to create a Japanese version of the ISS, which suggests that it has been discussed by many researchers in Japan.

The second stream is the IDI based on the development model of intercultural sensitivity (DMIS) presented by Bennet (2013). Yamamoto and Tanno (2002) examined the applicability of Bennet’s (year) IDI in the Japanese context. Sakata and Maeda (2005) noted the increasing attention afforded to IDI in Japan. Hagley (2020) combined Chen and Starosta (2000) with Bennet’s DMIS (2014) to create a questionnaire to observe how international virtual exchanges (the use of communication systems that enable students from different cultures and countries to interact and learn from each other) within EFL classes can change students’ intercultural sensitivity.

IDI scores of participants of the Cabinet Office’s Ship for World Youth Leaders have also been measured (Ishii, 2011). The IDI was used by Winskowski (2015) to study Japanese university students at junior colleges to analyze how IDI scores changed depending on whether the students had overseas experience. Several studies note the concept of DMIS, the questions asked, and the various stages; however, the number of studies measuring and analyzing IDI scores is small. The use of IDI scores is expected to become important when dealing with intercultural sensitivity in Japan in the future.

Outside of Japan, the IDI has been used in fields related to intercultural exchanges and medicine, such as a study using the IDI on high school students attending international schools (Straffon, 2003), one with university students studying abroad (Engle & Engle, 2004), one on the development of intercultural sensitivity measures among students of four-year STEM programs (Jaiswal et al., 2024), and one analyzing the intercultural sensitivity of pediatric residents who received intercultural training (Altshuler et al., 2003). The importance of developing the ability to handle diversity in teacher development programs for physical education teachers has also been studied (Burden et al., 2004). Research is also being conducted in a wide range of fields, including business management, health, human resource development, language, psychology, and teacher development.

**Materials and Methods**

*Study Design and Participants*

The structure of the target class was as follows: 15 classes were held in one semester (4 were online and 11 were in-person), and the class duration was 90 minutes, with yoga in the first 45 minutes and various sports in the second 45 minutes. Students were asked for responses to confirm their ID scores before class started. They were asked to fill out a reflection sheet which also served to verify their attendance after the class. The reflection sheets took an average of five minutes to complete.

The targets of the study were 12 first-year university students belonging to international faculties of a university in the Kansai region. The study was explained to them in advance, and after they understood the details, they were free to choose whether to participate or not. This decision did not adversely impact these students. The IDI questionnaire was administered in 30 minutes. All 12 students completed it.

Students who took physical education classes throughout the year were chosen for this study. The target class consisted of two departments accepting a large number of overseas students, of which approximately half were enrolled in April 2022 and half in October 2023. In other words, the first half had already taken physical education classes at the same university from April to July 2022, and the second half were new entrants to the same class. The participants included students from seven countries: the United States of America, China, the United Kingdom, India, Japan, Romania, and Vietnam. The physical education classes were conducted in English. Table I summarizes the attributes of the participants.

Table I. Participant Characteristics

Items	Unit	Participants (n = 12)
Sex	n (%)	
Male		6 (50)

Female		6	(50)
Age, year	mean (SD)	19	(5.4)
Year in university	n (%)		
Freshman		8	(66)
Sophomore		4	(33)
Duration of study in the university	mean (SD)	4.6	(1.4)
Intercultural Development Inventory Score			
PO	mean (SD)	119.4	(4.2)
DO	mean (SD)	86.3	(14.5)
Class attendance	mean (SD)	9.9	(0.9)

Note. SD: standard deviation; PO: perceived orientation; DO: developmental orientation.

*Evaluation Items*

Development Model of Intercultural Sensitivity

The DMIS proposed by Bennet (2017) is synonymous with individual worldview orientation and cross-cultural sensitivity. As individuals experience various cultural differences and rebuild their worldview into a more complex system, their cognitive, emotional, and behavioral responses to cultural differences become more multifaceted; that is, their intercultural communication ability changes. This theory is distinctive in that it considers worldview orientation and sensitivity from a developmental perspective, from ethnocentrism (1. Denial of differences → 2. Defense/Reversal of differences → 3. Minimization of differences) to ethnorelativism (4. Acceptance of differences → 5. Adaptation to differences → 6. Integration of differences). The first three stages can be considered as the ethnocentric half, and the second three as the ethnorelativistic half. The shift from the ethnocentric to ethnorelativistic stage is considered to be the development from simpler perceptions and shallow intercultural experiences to more complex perceptions and more sophisticated intercultural experiences. The ethnocentric stage centers on one’s own culture as the basis of reality, and the ethnorelativistic stage considers an individual’s experiences as one of several possibilities.

In the “denial” stage, cultural differences are not practiced at all or are taken as the “other” such as foreigners and immigrants. In the “defense” stage, people regard their culture as the only authentic culture. The world is perceived in the form of “us” and “them,” with the idea that their own culture is high grade and other cultures are low grade. Under the “minimization” of cultural differences, individuals think about the worldview of their culture as a universal one. It marks the stage in which threats of cultural difference are neutralized by being subsumed by including the differences in common. In the “acceptance” stage, people interpret their culture as just one of many other equally complex worldviews. They can experience other cultures as distinct from their own and understand that everyone is equal as human beings.

In “adaptation,” individuals develop appropriate perspectives and behaviors of a culture through experience and are able to express these cultural experiences. “Integration” involves a shift in perspective across cultures, similar to how a person changes their feelings and ways of communicating with their grandparents as compared to their spouse. The only difference is whether the shift in perspectives is between cultures or individuals. Thus, just as we can freely switch worldviews in familiar places, people in the integration stage can freely move in and out of the worldview orientations of different cultures. They also find their identity by responding to cultural differences in various situations (Bennet, 2013).

Table II shows the continuity of DMIS. Based on an understanding of these six stages, the relationship between the shift in the IDI scores of the target students and their physical and mental conditions was divided into three parts, namely, the beginning, middle, and end of the semester, and each part was observed.

Table II. Six Continuum Stages of DMIS

Experience of Difference					
Denial	Defense	Minimization	Acceptance	Adaptation	Integration
Ethnocentrism			Ethnorelativism		

Intercultural Development Inventory

We used the IDI (Hammer et al., 2003), based on the DMIS by Bennet (2014). The DMIS model posits that when an individual’s intercultural potential increases, their intercultural experiences become more complex and sophisticated. Confirmatory factor analysis, reliability analysis, and construct validity were validated for five major spans of DMIS: 1) Denial/Defense, 2) Reversal, 3) Minimization, 4) Acceptance/Adaptation, and 5) Encapsulated Marginality, each with an  $\alpha$ -coefficient of 0.8 or greater. Hammer et al. (2003) and Paige et al. (2003) explain that the IDI is internally consistent because four stages of the IDI have an alpha coefficient of 0.8 or higher, with exceptions of 0.77 for Acceptance and 0.74 for Behavioral Adaptation. The participants responded to 50 questions on a 5-point Likert scale for agreement or disagreement. Under the IDI scoring range, 55–70 is Denial, 70–85 is Polarization: Defense/Denial, 85–115 is Minimization, 115–130 is Acceptance, and 130–145 is Acceptance.

Garrett-Rucks (2014) acknowledges that Bennet’s IDI is useful as a tool to measure intercultural competence in many fields, but also mentions that it may discourage some researchers due to the price. We confirmed the reliability, certainty, and validity of Bennet’s intercultural sensitivity theory, and employed the IDI created using Bennet’s intercultural sensitivity model to proceed with our research.

*Class Reflection and Condition*

Students were requested to fill feedback sheets at the end of each weekly class. The first item of the feedback sheet asked students to rate their condition in terms of physical, feeling, balanced diet, and sleep, on the day of the class on a 5-point scale (5 = excellent, 1 = poor). Next, students were asked to reflect on their activities in the physical education class and responded on whether they enjoyed the sport, acquired new skills, cooperated with others, actively participated, and had a refreshed, changed mood on a 4-point scale (4 = very much, 1 = not at all). Although we did not examine the validity and reliability of each of these items, they were set independently considering the ease of response.

*Statistical Analysis*

The IDI and reflection sheet were used to conduct the following analysis to clarify the connection between the IDI scores and physical and mental health. First, Spearman’s correlation coefficient rho was calculated to verify whether there were discrepancy in class attendance based on the IDI score. Uniformly, Spearman’s correlation coefficient rho was computed to comprehend the relationship between IDI scores and class reflection. Further, to clarify the importance of the class to the students’ condition, we similarly calculated the correlation coefficients between these variables. To account for the students’ class experiences and changes in their reflections, we divided the reflection scores into the beginning (Class 1–5), middle (Class 6–10), and end of the semester (Class 11–15), and used the average values for each period for analysis. At the time of analysis, the statistical significance level was set at 5%. Statistical analysis software R version 4.2.2 was used for the analysis.

**Results**

The participants’ basic attributes are shown in Table II. In terms of IDI scores, for PO, no individuals were at the 1) Denial and 2) Polarization: Defense/Denial stages, two were at 3) Minimization, ten at 4) Acceptance, and none at 5) Adaptation. For DO, one person was at the 1) Denial stage, four were at Polarization: Defense/Denial, seven at 3) Minimization, and none at 4) Acceptance and 5) Adaptation stages. Furthermore, 11 in-person classes were conducted in this study, and the average number of attendances was  $9.9 \pm 0.9$ .

The correlation between the IDI score and frequent occurrence of attendance at the beginning of class had a significant correlation between the DO score at the beginning of the class and attendance frequent occurrence ( $\rho = 0.645, p = 0.024$ ), verifying the trend that the higher the DO score, the higher the attendance. In contrast, there was no significant correlation between attendance frequency and the PO score ( $\rho = .400, p = 0.198$ ). Table III shows the correlation between IDI scores and class reflection values. No reflection items were found to be statistically significantly related to higher IDI scores.

Table III. Relation between Intercultural Development Inventory Scores and Class Reflection

	Perceived Orientation <sup>1</sup> pre		Developmental Orientation <sup>2</sup> pre	
	rho	p-value	rho	p-value
<i>&lt;enjoyment&gt;</i>				
beginning of the semester	0.238	0.457	0.475	0.118
middle of the semester	0.237	0.459	0.237	0.459
end of the semester	0.059	0.855	0.059	0.855
<i>&lt;skill&gt;</i>				
beginning of the semester	0.094	0.772	0.363	0.245
middle of the semester	0.309	0.329	0.348	0.268
end of the semester	0.203	0.526	0.301	0.342
<i>&lt;cooperation&gt;</i>				
beginning of the semester	-0.266	0.404	0.059	0.856
middle of the semester	-0.082	0.800	0.164	0.610
end of the semester	0.146	0.652	0.374	0.230
<i>&lt;activeness&gt;</i>				
beginning of the semester	-0.016	0.960	0.392	0.207
middle of the semester	-0.480	0.114	-0.480	0.114
end of the semester	-0.069	0.831	0.161	0.617
<i>&lt;refreshment&gt;</i>				
beginning of the semester	0.231	0.470	<b>0.508</b>	0.091
middle of the semester	0.059	0.855	0.059	0.855
end of the semester	0.146	0.652	0.374	0.230

*Note.* Bold text indicates a statistically significant correlation.

<sup>1</sup>Numerical value of where one would place oneself in the Intercultural Development Inventory (IDI).

<sup>2</sup>Actual value of the respondent’s IDI.

Statistically significant associations were found between the end-of-semester reflection item (enjoy the sport) and end-of-semester condition (physical) ( $\rho = 0.695$ ,  $p = 0.012$ ) (Table IV). We found statistically significant associations between the beginning-of-semester reflection (acquired new skills) with the middle-of-semester condition (sleep) ( $\rho = 0.584$ ,  $p = 0.046$ ), middle-of-semester reflection item (acquired new skills) with the end-of-semester condition (physical) ( $\rho = 0.637$ ,  $p = 0.026$ ), and the end-of-semester condition (sleep) item ( $\rho = 0.694$ ,  $p = 0.012$ ). Beginning-of-semester reflection (acquired new skills) was statistically significant with the end-of-semester condition (physical) ( $\rho = 0.915$ ,  $p < 0.001$ ), end-of-semester condition (feeling) ( $\rho = 0.958$ ,  $p < 0.001$ ), end-of-semester condition (diet) ( $\rho = 0.775$ ,  $p = 0.003$ ), middle-of-semester condition (sleep) ( $\rho = 0.753$ ,  $p = 0.005$ ), and end-of-semester condition (sleep) ( $\rho = 0.779$ ,  $p = 0.003$ ). We also found a statistically significant relationship between the end-of-semester reflection (cooperate with others) with end-of-semester condition (physical) ( $\rho = 0.897$ ,  $p < 0.001$ ), and end-of-semester condition (feeling) ( $\rho = 0.771$ ,  $p = 0.003$ ).

Table IV. Relation between IDI Scores and Class Reflection

	beginning of the semester		middle of the semester		end of the semester	
	rho	p-value	Rho	p-value	rho	p-value
mean Physical						
<enjoyment>						
beginning of the semester	-0,014	0,966	-0,164	0,610	0,189	0,556
middle of the semester	-0,063	0,846	-0,308	0,330	0,265	0,405
end of the semester	-0,360	0,250	0,010	0,976	<b>0,695</b>	<b>0,012</b>
<skill>						
beginning of the semester	-0,013	0,969	0,232	0,467	0,523	0,081
middle of the semester	0,026	0,936	0,182	0,572	<b>0,637</b>	<b>0,026</b>
end of the semester	0,009	0,979	0,408	0,188	<b>0,915</b>	<b>&lt; 0,001</b>
<cooperation>						
beginning of the semester	0,039	0,903	0,245	0,443	0,416	0,179
middle of the semester	-0,103	0,751	0,093	0,773	0,519	0,084
end of the semester	0,135	0,676	0,509	0,091	<b>0,897</b>	<b>&lt; 0,001</b>
<activeness>						
beginning of the semester	0,186	0,562	0,276	0,386	-0,009	0,978
middle of the semester	-0,244	0,445	0,260	0,414	0,391	0,208
end of the semester	-0,103	0,750	0,310	0,326	<b>0,740</b>	<b>0,006</b>
<refreshment>						
beginning of the semester	0,031	0,925	-0,095	0,768	0,233	0,466
middle of the semester	-0,360	0,250	0,010	0,976	<b>0,695</b>	<b>0,012</b>
end of the semester	0,135	0,676	0,509	0,091	<b>0,897</b>	<b>&lt; 0,001</b>
mean Feeling						
<enjoyment>						
beginning of the semester	-0,158	0,624	-0,209	0,515	-0,049	0,880
middle of the semester	-0,226	0,479	-0,308	0,330	-0,048	0,882
end of the semester	-0,040	0,903	0,115	0,721	0,449	0,144
<skill>						
beginning of the semester	0,181	0,572	0,295	0,352	0,426	0,167
middle of the semester	0,210	0,513	0,301	0,342	0,492	0,104
end of the semester	0,045	0,889	0,503	0,095	<b>0,958</b>	<b>&lt; 0,001</b>
<cooperation>						
beginning of the semester	0,144	0,655	0,280	0,379	0,372	0,234
middle of the semester	0,033	0,919	0,140	0,665	0,348	0,268
end of the semester	0,131	0,684	0,573	0,051	<b>0,771</b>	<b>0,003</b>
<activeness>						
	=					
beginning of the semester	0,068	0,834	0,192	0,549	0,069	0,831
middle of the semester	0,322	0,308	0,417	0,178	0,489	0,107
end of the semester	0,024	0,940	0,362	0,247	<b>0,590</b>	<b>0,043</b>
<refreshment>						
beginning of the semester	-0,159	0,621	-0,150	0,641	0,002	0,994
middle of the semester	-0,040	0,903	0,115	0,721	0,449	0,144
end of the semester	0,131	0,684	0,573	0,051	<b>0,771</b>	<b>0,003</b>
mean Diet						
<enjoyment>						
beginning of the semester	-0,188	0,559	-0,209	0,515	-0,105	0,746
middle of the semester	-0,161	0,616	-0,308	0,330	-0,360	0,250

end of the semester	-0,035	0,915	0,115	0,721	0,102	0,752
<skill>						
beginning of the semester	0,137	0,672	0,295	0,352	0,463	0,130
middle of the semester	0,216	0,501	0,301	0,342	0,410	0,185
end of the semester	0,251	0,431	0,503	0,095	<b>0,775</b>	<b>0,003</b>
<cooperation>						
beginning of the semester	0,201	0,531	0,280	0,379	0,303	0,338
middle of the semester	0,059	0,856	0,140	0,665	0,177	0,582
end of the semester	0,341	0,278	0,573	0,051	0,481	0,113
<activeness>						
beginning of the semester	0,035	0,915	0,192	0,549	0,333	0,290
middle of the semester	0,281	0,377	0,417	0,178	0,439	0,153
end of the semester	0,148	0,646	0,362	0,247	0,288	0,364
<refreshment>						
beginning of the semester	-0,153	0,635	-0,150	0,641	-0,073	0,822
middle of the semester	-0,035	0,915	0,115	0,721	0,102	0,752
end of the semester	0,341	0,278	0,573	0,051	0,481	0,113
mean Sleep						
<enjoyment>						
beginning of the semester	0,341	0,277	0,308	0,330	0,112	0,729
middle of the semester	0,234	0,465	0,017	0,959	0,108	0,738
end of the semester	-0,155	0,631	0,198	0,536	0,406	0,191
<skill>						
beginning of the semester	0,278	0,381	<b>0,584</b>	<b>0,046</b>	0,450	0,142
middle of the semester	0,265	0,406	0,445	0,147	<b>0,694</b>	<b>0,012</b>
end of the semester	0,166	0,606	<b>0,753</b>	<b>0,005</b>	<b>0,779</b>	<b>0,003</b>
<cooperation>						
beginning of the semester	0,255	0,424	0,457	0,135	0,059	0,856
middle of the semester	0,194	0,547	0,405	0,192	0,197	0,540
end of the semester	0,107	0,740	0,610	0,035	0,467	0,126
<activeness>						
beginning of the semester	0,236	0,460	0,485	0,110	-0,063	0,846
middle of the semester	-0,177	0,583	0,134	0,677	0,195	0,543
end of the semester	-0,035	0,914	0,444	0,148	0,239	0,454
<refreshment>						
beginning of the semester	0,342	0,277	0,358	0,254	0,092	0,777
middle of the semester	-0,155	0,631	0,198	0,536	0,406	0,191
end of the semester	0,107	0,740	0,610	0,035	0,467	0,126

Note. Bold text indicates a statistically significant correlation.

The end-of-semester reflection (actively participated) had a statistically significant relationship with the end-of-semester condition (physical) ( $\rho = 0.740$ ,  $p = 0.006$ ) and end-of-semester condition (feeling) ( $\rho = 0.590$ ,  $p = 0.043$ ). Middle-of-semester reflection (refreshed change of mood) had a statistically significant relationship with the end-of-semester condition (physical) ( $\rho = 0.695$ ,  $p = 0.012$ ). Finally, the beginning-of-semester reflection (refreshed change of mood) had a statistically significant relationship with the end-of-semester condition (physical) ( $\rho = 0.897$ ,  $p = < 0.001$ ) and the end-of-semester condition (feeling) ( $\rho = 0.771$ ,  $p = 0.003$ ).

## Discussion

This study aimed to clarify the relationship between in-person physical education class experience, IDI, and physical and mental health, for which we studied 12 first-year university students belonging to international faculties of a university in the Kansai region. The results revealed a correlation between higher IDI scores and higher attendance, and that better students' scores on items related to physical health at the end of the semester resulted in more positive class reflections. Jaiswal et al. (2024) explained that direct intercultural experiences affect students' intercultural sensitivity. Our study further refined their results using IDI values and students' responses to understand how classroom experiences vary based on intercultural skills and whether varying classroom experiences affect student health differently.

### *Correlation between IDI Score, Attendance Frequency, and Class Reflection*

In this study, we discovered a significant correlation between DO scores and attendance at the beginning of class: the higher the DO score, the more frequent the attendance. A statistically significant relationship was also discovered between high IDI scores and questions about the students' refreshment level (at the beginning of the semester). Paige et al. (2003) used IDI scores to investigate how short-term study abroad affected intercultural sensitivity among college students. It found that, while short-term study abroad experiences positively affected students' overall IDI scores, they did not cause a significant change across each DMIS stage.

Thus, in-person programs with people from other cultures were likely to produce positive results on IDI scores. We found a positive correlation between student IDI scores and student attendance in face-to-face physical education classes. As noted by Philip et al. (2006), the results show that it helped cultivate intercultural competence, which is an essential requirement in today's globalized world.

Many international students live alone away from their countries of origin and familiar environments. Universities should be more culturally sensitive as international students must adapt to the national culture and handle the combined stress of adjusting to university life, the language, personal relationships, financial burdens, and personal issues (Mori, 2000). The correlation between the IDI scores and frequency of attendance suggests that intercultural sensitivity may be deeply linked to students' own state of active participation in class, attitude, and rhythm of life. The study results may be treated as information required to support students' lives.

Although IDI scores correlated with class attendance, they were not related to class reflection in this study. Therefore, there may not be much variation in class experience among the students.

#### *Relationship between Class Reflection Results and Student Condition*

Several items were found to have a statistically significant association. Kiuchi et al. (2009) showed that behavioral science-based physical education programs have a comprehensive effect and activate psychological, behavioral, and physiological variables mainly related to physical activity. A novel result of this study was that class development focusing on intercultural sensitivity and communication skills impacted the relationship between class reflection and student condition. Kiuchi et al. (2009) explained that, when developing a program, it is important to balance general physical activity rather than following an unbalanced program. The discussion on the effect of the IDI values and reflections in this study is expected to assist in the development of future programs.

Interestingly, only the end-of-semester item, "acquired new skills," was found to be significantly related to all items of physical, feeling, diet, and sleep. Stodden et al. (2008) argued that the development of motor ability is an underlying important factor in performing physical activity. The argument by Bailey (2006) and the association between intrinsic motivation in sports in physical education classes and positive results (Ntoumanis, 2001) suggests that, based on this study, improving motor ability may impact students' physical activity, as well as emotional and life aspects. A positive approach to student condition can further influence their athletic ability and motivation, which is expected to lead to a virtuous cycle of athletic activity.

#### *Limitations*

Despite the small number of subjects (12), this study was conducted in an underexamined area. Further, the questionnaire was designed to enable the evaluation of valid results by surveying several perspectives, including a comparison of IDI scores before and after the semester, student conditions, and class reflections, which were analyzed together with the questionnaire. Further studies with a larger number of subjects are expected to lead to more multifaceted findings.

The questions used on the Reflection Sheet in this study were created by the authors. Therefore, their reliability, certainty, and validity need to be confirmed in the future. Furthermore, with the goal of conducting further detailed analysis in the future, there is room to consider the use of questionnaires other than the IDI questionnaires and the Reflection Sheets used in this study, for example, administering a questionnaire with a spiritual aspect. Moreover, a third viewpoint needs to be established, not just from the perspective of the target students and instructors, but third-party opinions, or by video recording and quantifying the direct cultural exchange between students.

IDI scores could likely have been affected by events outside of the physical education classes. For example, international students encounter several stressors, including language, adaptation to educational, social and cultural factors, discrimination, and financial issues (Smith & Khawaja, 2011). In this study, IDI scores were compared with the reflection sheets to focus on events that occurred in the physical education class. Further, as the study was conducted in one class at one university, further research should be conducted to determine whether the results would remain applicable in other universities, including those overseas.

#### **Conclusion**

Among students studying in an environment different from that of their home country, students with higher IDI scores were found to have higher attendance; the more positive their class reflection, the higher the tendency for having a better subjective physical condition at the end of the class. These results propose that IDI should be regarded when arranging support for international students and highlight that active class participation may affect the general health of students outside class. It is essential to understand this when scheduling and conducting classes.

#### **References**

- Altshuler, L., Sussman, N. M., & Kachur, E. (2003). Assessing changes in intercultural sensitivity among physician trainees using the intercultural development inventory. *International Journal of Intercultural Relations*, 27(4), 387–401. [https://doi.org/10.1016/S0147-1767\(03\)00029-4](https://doi.org/10.1016/S0147-1767(03)00029-4)
- Anderson, P. H., Lawton, L., Rexeisen, R. J., & Hubbard, A. C. (2006). Short-term study abroad and intercultural sensitivity: A pilot study. *International Journal of Intercultural Relations*, 30(4), 457–469. <https://doi.org/10.1016/j.ijintrel.2005.10.004>

- Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *Journal of School Health*, 76(8), 397–401. <https://doi.org/10.1111/j.1746-1561.2006.00132.x>
- Bennet, M. (rev. 2014). *A developmental model of intercultural sensitivity*. The Intercultural Development Research Institute. [DMIS Model - IDR Institute](https://www.dmis-model-idr.org/)
- Bennett, M. (2013). *Basic concepts of intercultural communication: Paradigms, principles, & practices*. Intercultural Press.
- Bronfenbrenner, U., Harding, J., & Gallwey, M. (1958). *The measurement of skill in social perception*. In McClelland, D.C. (Ed.), *Talent and society*. Van Nostrand.
- Burden, J. W., Hodge, S. R., O'Bryant, C. P., & Harrison, L. (2004). From colorblindness to intercultural sensitivity: Infusing diversity training in PETE programs. *Quest*, 56(2), 173–189. <https://doi.org/10.1080/00336297.2004.10491821>
- Chen, G. M., & Starosta, W. J. (2000). The development and validation of the Intercultural Sensitivity Scale. *APA PsycTests*. <https://psycnet.apa.org/doi/10.1037/t61546-000>
- Chen, G. M., & Starosta, W. J. (1997). A review of the concept of intercultural sensitivity. *Human Communication, 1*, 1–16.
- Engle, L., & Engle, J. (2004). Assessing language acquisition and intercultural sensitivity development in relation to study abroad program design. *Frontiers: The Interdisciplinary Journal of Study Abroad*, 10(1), 219–236. <https://doi.org/10.36366/frontiers.v10i1.142>
- Garrett-Rucks, P. (2014). Measuring instructed language learners' IC development: Discrepancies between assessment models by Byram and Bennett. *International Journal of Intercultural Relations*, 41, 181–191. <https://doi.org/10.1016/j.ijintrel.2013.12.009>
- Gollnick, D.M., & Chinn, P. (1998). *Multicultural education in a pluralistic society*. Charles Merrill.
- Hagley, E. (2020). Effects of virtual exchange in the EFL classroom on students' cultural and intercultural sensitivity. *Computer-Assisted Language Learning Electronic Journal*, 21(3), 74–87.
- Hammer, M. R., Bennett, M. J., & Wiseman, R. (2003). Measuring intercultural sensitivity: The intercultural development inventory. *International Journal of Intercultural Relations*, 27(4), 421–443. [https://doi.org/10.1016/S0147-1767\(03\)00032-4](https://doi.org/10.1016/S0147-1767(03)00032-4)
- Hu, A., & Ito, M. (2023). Relational mobility and intercultural sensitivity of Japanese students in the Coronavirus pandemic. *Institute for Liberal Arts Education, Ibaraki University*, 6, 89–103.
- Hua, J., Kondo, A., & Moross, J. (2023). Enhancing intercultural sensitivity in Japanese nursing students through international online nursing courses: A quasi-experimental study. *Nurse Education Today*, 128, 105870. <https://doi.org/10.1016/j.nedt.2023.105870>
- Ishii, H. (2011). Developing global mindset onboard. Challenges of the Ship for World Youth Program of Japan. *The Scale of Globalization*, 102.
- Izumo, T., Kowata, H., & Kawakita, H. (2007). A study on the present condition of the class of the physical education with foreign students at universities in Japan: Focusing on the actual condition and the issues regarding class management, *Japan Journal for Health, Physical Education, Recreation, and Dance in Universities*, 4(1), 45–56
- Jaiswal, A., Jin, L., & Acheson, K. (2024). Evaluation of STEM program on student intercultural development: Do intercultural interventions work? *Innovative Higher Education*, 49(3), 541–559. <https://doi.org/10.1007/s10755-023-09691-4>
- Kiuchi, A., Arai, H., Urai, R., & Nakamura, T. (2009). Effects of a behavioral science-based physical education program on the physical activity-related variables of college freshmen: Project FYPE. *Japan Journal of Physical Education, Health and Sport Sciences*, 54(1), 145–159. <https://doi.org/10.5432/jjpehss.a540115>
- McClelland, D. C. (1958). Review and prospect. In McClelland, D.C. (Ed.), *Talent and Society*. Van Nostrand.
- Mori, S. C. (2000). Addressing the mental health concerns of international students. *Journal of Counseling & Development*, 78(2), 137–144. <https://doi.org/10.1002/j.1556-6676.2000.tb02571.x>
- Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *British Journal of Educational Psychology*, 71(2), 225–242. <https://doi.org/10.1348/000709901158497>
- Paige, R. M., Jacobs-Cassuto, M., Yershova, Y. A., & DeJaeghere, J. (2003). Assessing intercultural sensitivity: An empirical analysis of the Hammer and Bennett Intercultural Development Inventory. *International Journal of Intercultural Relations*, 27(4), 467–486. [https://doi.org/10.1016/S0147-1767\(03\)00034-8](https://doi.org/10.1016/S0147-1767(03)00034-8)
- Result of international student survey in Japan, 2023*. Study in Japan Official Website. (n.d.-b). <https://www.studyinjapan.go.jp/en/statistics/enrollment/data/2405241100.html>
- Rowan, L., Bourke, T., L'Estrange, L., Lunn Brownlee, J., Ryan, M., Walker, S., & Churchward, P. (2021). How does initial teacher education research frame the challenge of preparing future teachers for student diversity in schools? A systematic review of literature. *Review of Educational Research*, 91(1), 112–158. <https://doi.org/10.3102/0034654320979171>
- Sakata, H., & Maeda, Y. (2005). Assessment of a Diversity Training Program for Japanese University Students Using Intercultural Development Inventory (IDI). *Tokushima University International Center*, 1, 1–18.

- Sasaki, H. (2018). The transition and problems of the teaching theory of “physical development exercise” in elementary school physical education course after World War II. *Kokushikan Journal of the Humanities*, 8, 57–76.
- Smith, R. A., & Khawaja, N. G. (2011). A review of the acculturation experiences of international students. *International Journal of Intercultural Relations*, 35(6), 699–713. <https://doi.org/10.1016/j.ijintrel.2011.08.004>
- Stodden, D. F., Goodway, J. D., Langendorfer, S. J., Roberton, M. A., Rudisill, M. E., Garcia, C., & Garcia, L. E. (2008). A developmental perspective on the role of motor skill competence in physical activity: An emergent relationship. *Quest*, 60(2), 290–306. <https://doi.org/10.1080/00336297.2008.10483582>
- Straffon, D. A. (2003). Assessing the intercultural sensitivity of high school students attending an international school. *International Journal of Intercultural Relations*, 27(4), 487–501. [https://doi.org/10.1016/S0147-1767\(03\)00035-X](https://doi.org/10.1016/S0147-1767(03)00035-X)
- Winskowski, K. (2015). An exploratory profile of students' intercultural awareness in an international studies program: An IDI study. *Bulletin of Morioka Junior College Iwate Prefectural University*, 17, 77–83.
- Wu, H. P., Garza, E., & Guzman, N. (2015). International student’s challenge and adjustment to college. *Education Research International*, 2015(1), 202753. <https://doi.org/10.1155/2015/202753>
- Yamamoto, S., & Tanno, D. (2002). Applicability of the Intercultural Development Inventory: Toward the development of Japanese version. *Journal of Aomori Public College*, 7(2), 24–42.