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THE INFLUENCE OF CURRICULUM ADAPTATION AND INTERCULTURAL COMMUNICATION ON THE UNDERSTANDING OF INDONESIAN BIODIVERSITY IN AICHI UNIVERSITY OF EDUCATION AFFILIATED SENIOR HIGH SCHOOL JAPAN THROUGH THE STUDENT TEACHING PRACTICE PROGRAM

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Abstract

This study aims to determine the influence of curriculum adaptation and intercultural communication on the understanding of Indonesian biodiversity through the student teaching practice program in Aichi University of Education Affiliated Senior High School, Japan. This type of research employs an experimental design with a quantitative approach. Data were obtained through questionnaires with actions carried out during teaching practice. Analysis was carried out using multiple linear regression and path analysis. The results show that there is a significant influence of intervention from teaching practice teachers on the understanding of Indonesian Biodiversity. This article assesses the impact of variable X1 (curriculum adaptation) and variable X2 (communication between people of different cultures) on Y (understanding of Indonesian biodiversity in Japanese students) by considering the intervention (Z) of teaching practice students as a strategic mediator connecting the two. The study confirmed that student intervention in teaching practice acts as an effective mediator in improving understanding of Indonesian biodiversity. Curriculum adaptation (X1) and cross-cultural communication (X2) significantly influence Japanese students' understanding (Y), both directly and indirectly through intervention (Z), thus strengthening the effectiveness of contextual and intercultural learning.

Keywords Curriculum, Intercultural Communication, Teaching Practice, Biodiversity.

INTRODUCTION

This research is motivated by the importance of understanding Indonesian biodiversity for high school students in Japan in the context of educational globalization. Differences in educational systems require appropriate curriculum adaptations and effective intercultural communication. Student teaching practice programs serve as a strategic medium for transferring this knowledge. However, the extent to which these two variables influence each other remains unknown, necessitating an in-depth study to improve the effectiveness of cross-cultural learning. Educational curricula are fundamentally designed to meet the needs of students within a specific social and cultural context (Whiley et al., 2017). When the learning process takes place in a foreign environment, such as when Indonesian teachers or prospective teachers teach in a Japanese school, special strategies are required to ensure that the curriculum from the home country remains relevant, communicative, and effectively implemented. This adjustment process is known as curriculum adaptation, a systematic effort to change, modify, adjust, or add specific elements of the curriculum to suit the needs and characteristics of students (Sawyer, 2001).

One of the biggest challenges in international education is teaching material related to a country's culture or uniqueness to students from other countries (Jenderal et al., 2021). In this context, Indonesian teaching internship students assigned to teach at various high schools in Japan are often asked to introduce material on Indonesia's biodiversity as part of academic exchange programs, cultural diplomacy, or educational cooperation (Acuña et al., 2019). Indonesia's biodiversity is among the richest in the world, yet it remains largely unknown to most Japanese students.

Japanese students' understanding of Indonesia's rich biodiversity is greatly influenced by how student teachers adapt their curriculum and teaching strategies (Cohen et al., 2004). This is crucial because understanding biodiversity involves not only biological knowledge but also ecological, geographical, economic, and cultural contexts (Asma Id Babou, 2023). Therefore, without appropriate curriculum adaptation, this material can be difficult for students without a background or direct experience with Indonesia's natural environment to grasp (Ornstein & Hunkins, 2018).

Curriculum adaptation can be defined as the process of modifying or adjusting the curriculum to align with the needs of students, the educational structure, local culture, environmental context, and the characteristics of the target class (Tarumasely, 2022). Adaptation can include: 1) Adaptation of content, namely simplifying material, adding local context, prioritizing

concepts, or integrating more relevant knowledge; 2) Adaptation of methods, changing teaching approaches, strengthening active learning, problem-based learning, or collaborative learning; 3) Adaptation of language, especially important because Japanese students generally learn science materials using Japanese, not English. Teaching practice students need to understand the level of students' language abilities; 4) Adaptation of learning media, such as the use of images, videos, simulations, maps, 3D models, and interactive technology; 5) Adaptation of assessment, creating simpler evaluation methods that are more appropriate to students' abilities (Gleason, 2018).

Based on observations and interviews in a preliminary study of Indonesian students conducting teaching internships at high schools in Nagoya, Japan, a number of significant academic concerns were identified. Students experienced difficulties in contextually conveying Indonesian biodiversity material to Japanese students. This was due to differences in their background knowledge and culture, as well as a lack of references relevant to the students' local conditions. Furthermore, students tended to use learning approaches that were still oriented toward the Indonesian context, making them less able to bridge students' understanding of tropical biodiversity concepts they had not encountered directly.

Empirically, students' understanding of Indonesian biodiversity was also still theoretical and had not been integrated with cross-cultural communication strategies. They were not yet fully able to adapt the curriculum to suit the needs and characteristics of Japanese students. This situation indicates a gap between material mastery and cross-cultural pedagogical skills.

Therefore, the development of an adaptive curriculum and the strengthening of intercultural communication competencies are necessary. These efforts are crucial to assist students in delivering material more effectively, contextually, and relevantly, thereby enhancing their understanding of Indonesian biodiversity more comprehensively.

O.G. Tavstuha (2023). Research, "Studying Biodiversity in the Process of Training Future Biology Teachers," emphasizes the importance of conceptual preparation and hands-on learning experiences for prospective biology teachers to effectively deliver biodiversity material. However, this study primarily focuses on the context of teacher training in the students' home countries (Muryani et al., 2023). It does not address the process of curriculum adaptation when prospective teachers teach in international educational environments (Setiawan, 2022). O.G. Tavstuha's (2023) research focused on prospective teachers' conceptual readiness and learning experiences, but did not specifically examine how cross-border curriculum adaptation and intercultural communication

influence students' understanding in international contexts. Therefore, there is a research gap in integrating these two variables into teaching practices abroad, particularly in enhancing high school students' understanding of Indonesian biodiversity in Japan.

Research on student teaching internships abroad, particularly in Japan, is still limited to aspects of cultural adaptation, communication, and classroom strategies (Chris Watkins, 2007). Few studies have examined how student teaching internships adapt their home curriculum, specifically the Indonesian curriculum, to introduce specific topics such as Indonesian biodiversity to secondary school students in countries with different ecological contexts, national curricula, and learning expectations (Morgan, 2019).

Another research gap is the lack of analysis of the impact of curriculum adaptation on students' understanding. Most studies on biodiversity learning focus on the competencies of prospective teachers, rather than on student learning outcomes in the country where the teaching practice takes place. Furthermore, no research has specifically linked curriculum adaptation by teaching practice students to the effectiveness of delivering foreign biodiversity content, in this case, Indonesian biodiversity, to Japanese high school students (Mulyono, 2023). Therefore, your research fills an important gap by examining how Indonesian teaching practice students adapt their curriculum and the extent to which this adaptation affects Japanese students' understanding of Indonesian biodiversity. This research not only enriches the literature on biodiversity education but also contributes to the study of the internationalization of science teaching and the practice of cross-cultural pedagogy.

The study (Asma Id Babou, 2023) "Teaching Biodiversity: Towards a Sustainable and Engaged Education" emphasizes the importance of participatory, contextual, and sustainability-oriented pedagogical approaches. However, this study primarily focuses on general strategies for teaching biodiversity and fails to address how curriculum adaptations are implemented when teaching takes place in cross-cultural contexts, particularly by student teachers from other countries. This represents a relevant research gap.

To date, few studies have investigated how Indonesian student teachers adapt the national biodiversity curriculum when teaching in Japanese secondary schools. Curriculum adaptation is crucial given the differences in ecological contexts, student perceptions of biodiversity, and pedagogical expectations in Japanese schools. Furthermore, no research has explicitly assessed the extent to which curriculum adaptation influences Japanese students' understanding of Indonesian

biodiversity, a crucial aspect for developing a global perspective on environmental issues (Khoiri et al., 2022).

Thus, this research fills the gap in empirical evidence regarding the relationship between curriculum adaptation by teaching internship students and improved understanding of Indonesian biodiversity among international students. This research is expected to enrich the practice of biodiversity education to be more inclusive and globally oriented.

The study (Schlecht et al., 2026) "From local species monitoring to global value chain impacts: A starting point for assessing biodiversity impacts of higher education institutions" demonstrates that educational institutions have a strategic role in providing ecological impact through teaching, research, and institutional activities. However, its focus is more on direct ecological impacts and global value chains, rather than on how cross-national curriculum adaptations affect students' understanding of biodiversity in other countries.

A gap emerges when considering the context of international education, particularly the role of student teaching practicum students as agents of cross-cultural curriculum delivery. Research on curriculum adaptation in teaching practicums abroad is still limited to general pedagogical aspects and has not yet thoroughly examined how adaptations of material from the Indonesian biodiversity context are applied in Japanese high school classrooms. Furthermore, few studies link curriculum adaptation to changes in students' ecological understanding in Indonesia.

Thus, this study fills the gap linking curriculum adaptation practices, the transfer of biodiversity knowledge between countries, and its impact on students' understanding, an area that has not been widely explored in the biodiversity and international education literature.

Research (Faturachmat et al., 2025) *Biodiversity Literacy in Science Education* emphasizes the importance of biodiversity literacy as an integral part of science education. The results of the study indicate that biodiversity literacy encompasses not only conceptual knowledge of biodiversity but also an understanding of ecological, social, and sustainability values. Katili found that biodiversity learning integrated with the local context and an inquiry-based approach can increase students' awareness of environmental issues and encourage pro-environmental attitudes. However, this study focuses more on the general conceptual framework of biodiversity literacy and has not specifically examined the context of a megabiodiversity country like Indonesia.

In contrast to Katili's research, our research focuses on understanding Indonesian biodiversity, which encompasses students' knowledge of the richness of endemic species,

Indonesia's unique ecosystems, and real threats such as deforestation and habitat degradation. The main distinction of this research lies in the local context of Indonesia as a country with a high level of biodiversity, so that the understanding of biodiversity is not only conceptual, but also contextual and cultural. Thus, the research gap lies in the lack of empirical studies that measure understanding of biodiversity based on the Indonesian context, which this study seeks to fill in to strengthen the relevance of science education to national environmental challenges.

METHOD

This research was conducted at Aichi University of Education Affiliated Senior High School, Japan. This study used a quantitative approach with an exploratory research design to analyze the causal relationships between variables through path analysis. Path analysis was chosen because it can measure the direct and indirect influence of independent variables on dependent variables through intervening variables (John W. Creswell, 2014). The independent variables in this study are Curriculum Adaptation (X1), communication intercultural (X2), and the dependent variable is Understanding of Indonesian Biodiversity (Y), while Teaching Practice Students (Z) acts as an intervening variable that mediates the relationship between X1, X2, and Y.

The study population included students at partner schools where students conducted their teaching internships. The sample was determined using purposive sampling, using schools that implemented the latest curriculum and were the official locations for the students' teaching internships. The sample size was 13 respondents, taking into account the number of questionnaire items and the minimum requirements for path analysis.

Data were collected using an understanding questionnaire, which consisted of three parts according to the research variables. The Curriculum Adaptation Instrument (X1) included indicators of material suitability, learning flexibility, and integration of local contexts, the variable (X2) intercultural communication, and the Student Teaching Practice Instrument (Z) contained indicators of student engagement, quality of material delivery, and learning innovation. The Indonesian Biodiversity Understanding Instrument (Y) included knowledge of biodiversity concepts, examples of local species, and understanding of environmental conservation. The questionnaire used a Likert scale of 1–5. Content validity was consulted with experts in the fields of education and conservation, then tested using construct validity through item correlation analysis. Reliability was tested using Cronbach's alpha with a minimum limit of 0.7.

The data analysis technique was carried out through several stages. First, prerequisite tests included normality, linearity, and multicollinearity tests. Second, path analysis was conducted to determine the magnitude of the path coefficient between X1 and X2 on Y. This analysis also identified the indirect effect of Curriculum Adaptation on Understanding Indonesian Biodiversity through the involvement of Teaching Practice Students. The analysis used is path analysis to test the direct and indirect relationships between variables. Variables X1 (curriculum adaptation) and X2 (intercultural communication) are analyzed for their influence on Y (understanding of Indonesian biodiversity), both directly and through the mediating variable Z (student teaching practices). This model allows researchers to determine the extent to which teaching practices strengthen or mediate the relationship between curriculum adaptation and intercultural communication on student understanding. Thus, a comprehensive picture of the influence patterns and contributions of each variable in improving the understanding of Indonesian biodiversity is obtained.

FINDINGS AND DISCUSSION

Findings

The results of the study on the influence of curriculum adaptation and intercultural communication on the understanding of Indonesian biodiversity, as well as the influence of student teaching practice interventions on high school students in Nagoya, Japan, were very significant. Data collection was conducted through a Likert-scale questionnaire that included four components: the level of curriculum adaptation based on the Indonesian context, intercultural communication on the level of student understanding of Indonesian biodiversity, and student perceptions of the effectiveness of teaching practice interventions. The research sample consisted of 13 students who were selected purposively, considering the limited number of study groups in one class.

Table 1. One-Sample Kolmogorov-Smirnov Test

		Curriculum Adaptation	Intercultural Communication	Understanding of Indonesian Biodiversity
N		13	13	13
Normal Parameters[a]	Mean	86.54	80.08	86.38
	Std. Deviation	3.479	6.157	3.572
Most Extreme Differences	Absolute	.131	.257	.136
	Positive	.106	.257	.136
	Negative	-.131	-.128	-.076
Kolmogorov-Smirnov Z		.472	.926	.490
Asymp. Sig. (2-tailed)		.979	.358	.970

Test distribution is Normal

The results of the normality test on the research data regarding the influence of curriculum adaptation and intercultural communication on the understanding of Indonesian biodiversity showed a significance value of 0.970. This value exceeds the established significance limit of 0.05. Based on the decision-making criteria in the normality test, data is said to be normally distributed if the significance value is greater than 0.05. Thus, it can be concluded that the data in this study are normally distributed.

A normal data distribution indicates that the distribution of respondents' scores is relatively even and without extreme deviations. This indicates that the data obtained adequately represent the population and meet one of the important assumptions in inferential statistical analysis. Therefore, this research is worthy of proceeding to the hypothesis testing stage using parametric statistical methods, such as regression or correlation tests.

The decision to accept the normality assumption provides a strong basis for analyzing the relationship between curriculum adaptation and intercultural communication on understanding Indonesian biodiversity. By meeting the normality assumption, the results of subsequent hypothesis tests are expected to have a higher level of accuracy and validity. This is crucial to ensure that the research conclusions are credible and can be used as a basis for decision-making in developing a more contextual and inclusive curriculum and learning strategies.

Meeting the normality assumption is a crucial prerequisite in parametric statistical analysis because it directly impacts the accuracy of parameter estimates and the validity of hypothesis testing. When data is normally distributed, the likelihood of Type I and Type II errors is minimized, resulting in more accurate and reliable statistical test results (Abbas Tashakkori, 1987). Therefore,

hypothesis testing results conducted after meeting the normality assumption have a higher level of internal validity.

Furthermore (Budiyono, 2003), according to normal data distribution, it allows for the use of advanced analytical techniques such as t-tests, ANOVA, and linear regression, resulting in more precise interpretations. This is important in the context of educational research, as the resulting conclusions are not only descriptive but also inferential and can be generalized to a wider population.

In developing curriculum and learning strategies, validly analyzed data becomes the basis for evidence-based decision making (*evidence-based decision making*). (John W. Creswell, 2014) emphasized that the accuracy of the data analysis procedures used largely determines the quality of educational decisions. Thus, meeting the assumption of normality strengthens the credibility of research results as a basis for designing a more contextual curriculum that is responsive to student needs and supports the principle of inclusivity.

Furthermore, an inclusive learning approach requires an accurate understanding of the variations in student characteristics. Data analyzed while meeting statistical assumptions allows researchers to objectively capture patterns and differences (Sugiono, 2016). Therefore, valid research results not only contribute to theory development but also have practical implications for designing equitable and adaptive learning strategies.

Table 2. ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Understanding of Indonesian Biodiversity * Curriculum Adaptation	Between Groups	(Combined)	125.077	9	13.897	1.489	.409
		Linearity	94.753	1	94.753	10.152	.050
		Deviation from Linearity	30.324	8	3.790	.406	.863
	Within Groups		28.000	3	9.333		
	Total		153.077	12			

Test distribution is linear

The results of the linearity test indicate that the relationship between curriculum adaptation and intercultural communication on understanding Indonesian Biodiversity has a significance value of 0.863. This significance value is greater than the established significance level of 0.05. Thus, it can be concluded that the data meet the linearity assumption. This means that the relationship between

the independent variables (curriculum adaptation and intercultural communication) and the dependent variable (understanding Indonesian Biodiversity) is linear and does not deviate significantly from a straight line.

Fulfillment of the linearity assumption indicates that changes in curriculum adaptation and intercultural communication are followed by unidirectional and proportional changes in the level of understanding of Indonesian biodiversity. This provides a strong basis for the appropriate use of advanced analytical models, such as regression or correlation analysis, without violating basic statistical assumptions. Furthermore, these results indicate that a contextual curriculum adaptation approach and effective intercultural communication have a consistent relationship with increased student understanding of Indonesian biodiversity.

Based on the results of the linearity test, the decision was made to accept the null hypothesis, which states that the relationship between the variables is linear. Therefore, the data is suitable for further statistical analysis to examine the influence or contribution of curriculum adaptation and intercultural communication on a deeper understanding of Indonesian biodiversity.

Table 3. Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	**VIF**
1	Curriculum Adaptation	.979	1.022
	Intercultural Communication	.979	1.022

a. Dependent Variable: Understanding of Indonesian Biodiversity

The results of the multicollinearity test indicate that the variables of curriculum adaptation and intercultural communication do not experience multicollinearity problems in influencing the understanding of Indonesian Biodiversity. This is evidenced by the tolerance value of 0.979, which is far above the required minimum limit of 0.10. A high tolerance value indicates that the two independent variables have a low level of correlation with each other, so that each variable is able to explain its influence independently on the dependent variable. Thus, curriculum adaptation and intercultural communication can be included simultaneously in the regression model without causing distortion in the analysis results. The absence of multicollinearity indicates that the estimated regression coefficients are stable and reliable. Therefore, this research model is suitable

for analyzing the influence of curriculum adaptation and intercultural communication on the understanding of Indonesian Biodiversity accurately and objectively.

Table 4. ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	96.962	2	48.481	8.639	.007[a]
	Residual	56.115	10	5.612		
	Total	153.077	12			

a. Predictors: (Constant), Interc
ultural Communication, Curriculum Adaptation

b. Dependent Variable: Understanding of Indonesian Biodiversity

The results of multiple linear regression analysis indicate that the variables of Curriculum Adaptation and Intercultural Communication simultaneously have a significant effect on the understanding of Indonesian Biodiversity in high school students in Japan. Based on the results of the significance test, a significance value of 0.007 was obtained, which is smaller than the significance level of 0.05. It can be concluded that there is a significant influence of curriculum adaptation and intercultural communication on the understanding of Indonesian biodiversity.

Curriculum adaptation plays a crucial role in adapting Indonesian biodiversity material to the educational context and cultural background of high school students in Japan. This adaptation helps students understand the concept of Indonesian biodiversity more systematically and contextually. Meanwhile, intercultural communication contributes to bridging differences in language, values, and cultural perspectives between Indonesia and Japan, making the learning process more effective and meaningful.

Overall, the combination of appropriate curriculum adaptation and effective intercultural communication can enhance students' understanding of Indonesia's biodiversity. These findings underscore the importance of a cross-cultural approach in international education, particularly in the delivery of material related to global issues such as biodiversity. The results of this study are expected to serve as a basis for developing more inclusive and globally oriented curricula and learning strategies.

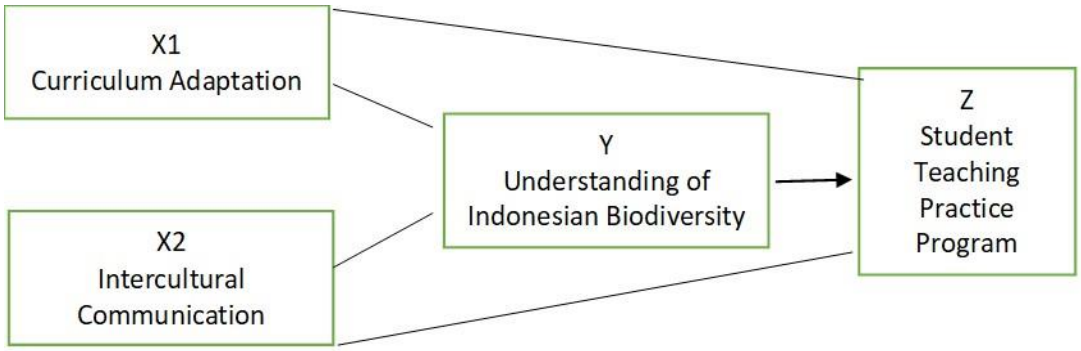

Figure 1. Path analysis

Table 5. Model Summary

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate
1	.796[a]	.633	.560	2.369

a. Predictors: (Constant), Intercultural Communication, Curriculum Adaptation

The analysis results show that the R-squared value of 0.633 in the summary model indicates a fairly strong level of model ability to explain the dependent variable. This value means that 63.3% of the variation in understanding of Indonesian biodiversity can be explained by the variables of curriculum adaptation and intercultural communication through student teaching practice interventions. Thus, the contribution of these two independent variables, mediated by teaching practice, is significant in improving student understanding.

However, there is an error in interpreting the percentage, which states a contribution of 6.3%, because mathematically, 0.633 is equivalent to 63.3%. This is important to clarify to avoid bias in drawing conclusions from the study. The high R-squared value indicates that the model has good predictive power, so student teaching practice interventions play a strategic role in transforming curriculum adaptation and intercultural communication into a more comprehensive understanding of Indonesian biodiversity.

On the other hand, the remaining 36.7% of the variation is influenced by factors outside the model, such as student background, supplementary learning methods, and the learning environment. Therefore, although these results show a significant influence, further research is still needed to identify other variables that have the potential to strengthen students' understanding more comprehensively.

Discussion

An analysis of the relationship between curriculum understanding and intercultural communication on the understanding of Indonesian biodiversity among high school students in Japan shows the important role of intervention (Z) carried out by teaching practice teachers. Referring to (O.G. Tavstuha, 2023) article "Studying Biodiversity in the Process of Training Future Biology Teachers", the biodiversity learning process depends not only on curriculum content, but also on pedagogical strategies and the cultural context of students. The teaching practice teacher's intervention functions as a reinforcing variable that bridges the differences in the Japanese educational system and the cultural background of students with the Indonesian biodiversity material. Teachers play a role in adapting the curriculum, using a contextual approach, and facilitating intercultural communication so that the concept of biodiversity can be understood meaningfully (Fryer & Bovee, 2018). According to Tavstuha's view, teachers' pedagogical experiences and reflections on teaching practice contribute to improving students' scientific understanding. Thus, intervention (Z) is a crucial factor that mediates and strengthens the relationship between curriculum understanding, intercultural communication, and understanding of Indonesian biodiversity.

Teaching practice programs designed with strong interventions, such as community-based learning, local culture, and contextual curriculum adaptation, have been shown to significantly impact students' understanding of biodiversity in Indonesia. The (Faturachmat et al., 2025) The framework emphasizes the importance of biodiversity literacy in science education, specifically the ability to understand the concept of biodiversity, develop conservation awareness, and exhibit environmental sensitivity as part of basic scientific competencies (Muryani et al., 2023). The article states that biodiversity literacy can be developed through learning models that are appropriate to the surrounding environment and real-world issues, and have a positive impact on commitment to biodiversity conservation.

Teaching practice interventions that integrate local curriculum adaptation and intercultural communication strengthen learning by providing direct experience with Indonesia's rich biodiversity (Laal et al., 2014). This approach goes beyond purely theoretical instruction, encouraging students to understand biodiversity through the local socio-cultural and ecological context, resulting in deeper literacy and relevance to the local community (Adger, 2000). This reinforces Katili's notion that contextual and environmentally-based learning can foster caring

behavior and applicable scientific skills (Koraneekij & Khlaisang, 2015).

Student teaching practicum programs involving field experiences and cross-cultural interactions can strengthen understanding of Indonesian biodiversity in a more contextual way than a purely theoretical approach. (Faturachmat et al., 2025) article, HEIs are given a significant role in monitoring local (BioBlitz) and global impacts through the value chain (EEIO-LCA), but the primary focus is on institutional biodiversity impact assessment methods, rather than on direct student learning (Hubalovsky et al., 2019).

Meanwhile, student teaching practices integrated with an adaptive curriculum enable students to directly understand local biodiversity, connect science with local cultural experiences, and enhance intercultural communication skills in a conservation context. This intervention provides hands-on experience in species identification, habitat observation, and cross-community discussions that strengthen understanding of biodiversity relevant to the Indonesian context—something not explicitly addressed in the more methodological approach of Schlecht et al. Thus, field education and cultural communication interventions have the potential to produce a deeper understanding of biodiversity in students than institutional assessment approaches alone (Gweon et al., 2011).

Interventions involving student teaching practices in Japan in the context of curriculum adaptation and intercultural communication demonstrate that students participating in overseas programs must master the Japanese language and cultural norms to adapt to their new environment, enabling effective communication and curriculum acceptance (Alan C Ornstein.Francis P.Hunkins, 2013). This adaptation encompasses Japanese language competency and intercultural communication strategies that enable students to understand local values, social norms, and teaching norms that differ from their home context (Nichols, 2017). This adaptation process actually influences how they deliver local material, for example, on Indonesian biodiversity, because they need to negotiate curriculum content with the Japanese cultural context, and (Asma Id Babou, 2023) article focuses on teachers' representations of the concept of biodiversity in the formal curriculum and its impact on students' understanding. The results indicate that teachers often view biodiversity within the framework of the complex relationships between living components and the environment in their curriculum, but their teaching approaches tend to be theoretical and lacking in hands-on experience (Peter, 2021).

Student interventions in Japan emphasize cultural context adaptation and cross-cultural communication as key components in transferring knowledge (e.g., Indonesian biodiversity) to different audiences, while Babou emphasizes teachers' conceptual understanding and representation within the curriculum itself. Both address the challenges of connecting curriculum theory with communication practices and student understanding, but from different angles: international students need to adapt to the cultural context of teaching, while local teachers need to enrich their pedagogical approaches to holistically understand biodiversity (Bruner, 2006).

The research results demonstrate a significant impact of teacher intervention on teaching practices, leading to the success of curriculum adaptation and an increased understanding of Indonesian biodiversity (Kolekar et al., 2018). This finding confirms that teachers are not merely curriculum implementers, but also agents of transformation who determine the quality of environmentally based contextual learning implementation.

Conceptually, teacher intervention in teaching practice can be understood as a form of pedagogical action consciously designed through strategies, methods, media, and learning approaches. In this context, approaches such as classroom action research (CAR) position teachers as reflective actors capable of designing, implementing, and evaluating learning continuously (Jamhariani et al., 2021). Thus, teacher intervention is key to bridging the gap between curriculum design and actual classroom practice.

Teacher Interventions Improve Conceptual Understanding. Research shows that practice-based interventions, such as experiments or lab activities, significantly improve students' science process skills and conceptual understanding (Jamhariani et al., 2021). This aligns with the key finding that when teachers actively intervene in biodiversity learning through contextual activities (e.g., environmental observations), student understanding improves. Contextual Biodiversity Learning still faces challenges, primarily due to limited teacher understanding and limited teaching materials. In this context, teacher interventions are a differentiating factor: teachers who are able to develop contextual teaching materials will improve students' understanding of local biodiversity.

Curriculum Adaptation as a Key Factor: Studies on curriculum adaptation confirm that teachers' ability to adapt learning strategies to curriculum changes is crucial for successful learning. This reinforces the research findings that teacher interventions strengthen the influence of curriculum adaptation on student understanding (Ebersohn & Eloff, 2004). Interventions in the STEM Curriculum. In the STEM context, learning interventions showed significant improvements

in student attitudes and understanding ($p < 0.001$). This indicates that structured teacher interventions can improve learning outcomes, including in multidisciplinary biodiversity learning (Chao, 2016).

Experience-Based Learning. The experiential learning approach in STEM education shows that integrating real-world experiences significantly improves student competency. This is relevant to biodiversity learning, which is ideally based in real Indonesian environments. Teacher interventions increase student learning motivation (Senkbeil & Ihme, 2017).

The majority of studies also found findings that indicate limitations or even contradictions, including: Limited Teacher Competence, research results show that many teachers are not ready to implement the new curriculum due to limited competence and understanding. This shows that teacher interventions are not always effective if not supported by adequate capacity. Interventions are not always significant. In certain studies, learning methods such as the case method did not show a significant effect on critical thinking skills. This shows that not all teacher interventions automatically result in increased understanding (Johnson et al., 2000).

Infrastructure Constraints emphasize that limited facilities and infrastructure are a major obstacle to curriculum implementation. In the context of biodiversity, limited access to learning environments (e.g., laboratories or observation sites) can reduce the effectiveness of interventions (Karsli & Ayas, 2014). Research on learning interventions shows that improvements in learning outcomes depend on factors such as age and program duration, suggesting that the effects of teacher interventions are not uniform. In the context of inclusive education, curriculum adaptations are often not fully effective due to implementation limitations (Gleason, 2018). This suggests that even when curriculum adaptations are implemented, without appropriate teacher intervention, the results remain limited.

The research results indicate that teacher interventions in teaching practice significantly strengthen the impact of curriculum adaptation on understanding Indonesian biodiversity. This finding is supported by numerous studies showing that teacher interventions improve student understanding, motivation, and skills (Kolekar et al., 2018).

The effectiveness of interventions is not universal. Factors such as teacher competence, educational system readiness, and resource availability are determining factors for success (Lim & Wang, 2016). Therefore, teacher interventions should be viewed as dynamic processes requiring systemic support. Overall, this research confirms that the key to successful biodiversity learning lies

not solely in the curriculum, but in how teachers bring the curriculum to life in the classroom (Lim & Wang, 2016).

CONCLUSION

Curriculum adaptation and communication between cultures have been proven to have a significant effect on Japanese students' understanding of Indonesian biodiversity. This is based on the results of multiple linear regression analysis with a significance result of 0.00, meaning it is smaller than 0.05, so decision-making has a strong influence. Intervention of teaching practice of high school students in Japan after conducting an intervention test through path analysis, the results of R-squared 0.633 mean 63%, and strongly intervene in the understanding of Indonesian biodiversity carried out by student teaching practice.

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