

ANALYZING LEARNING OUTCOMES THROUGH THE PACKAGING IN KOREA AND JAPAN STUDY ABROAD PROGRAM



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Abstract

The "Packaging in Korea and Japan" study abroad program offers students a unique opportunity to engage in experiential learning through immersive exposure to global packaging practices. This paper focuses on two key areas: (1) cultivating a global perspective and a professional attitude toward the packaging industry, and (2) enhancing knowledge in packaging. The purpose of our study is to begin to understand how a short-term, discipline-specific, faculty led study abroad program fosters the development of a global professional mindset while building a positive attitude to the global industry. To measure professional attitude, students completed a pre-survey before the course began and post-survey after the course was complete. To gauge a student's increase in knowledge, students were asked to complete a pre- and post survey with reflective essay for each packaging related site visit. To accomplish this, the faculty developed a series of un-graded surveys that students completed at the beginning and end of the site visit. Results indicate significant gains in packaging related knowledge and positive perspectives informed by real-world applications observed during the study abroad program. Additionally, the program fostered professional growth, with participants reporting greater confidence, global awareness, and cultural empathy through their reflective answers. These findings highlight the value of integrating experiential and international learning opportunities into discipline-specific higher education, particularly within professional fields like packaging, to prepare students for complex global challenges. As the first paper to analyze official program learning outcomes from a study abroad program targeting students in the packaging field, our results suggest that a discipline-specific study abroad program provides a positive stepping stone for students in the packaging and related

fields to develop into global professionals. For the purposes of this paper, the authors inductively apply Kolb's (1984) Experiential Learning Cycle model for understanding how the students transformed from the beginning to the end of the course.

Keywords: Packaging, Study Abroad, Experiential Education, Class Learning Outcome (CLO)

Study abroad programs provide students with transformative learning opportunities by merging cultural immersion and academic rigor (Redwine et al., 2018). These programs enable participants to observe professional practices in international contexts, enriching their academic and career prospects. The "Packaging in Korea and Japan" study abroad program is a unique initiative aimed at bridging theoretical knowledge with real-world applications in the packaging industry. The program was delivered as a four-credit elective special topic course, designed to offer students deep insights into the cultural, commercial and technological factors that shape the packaging industry in Korea and Japan. These countries were selected for their global leadership in packaging, logistics and sustainability, characterized by advanced technological infrastructure and strong commitments to eco-friendly innovation. By integrating structured classroom instruction with site visits to leading packaging facilities, the program offers students a comprehensive understanding of global packaging innovations and practices. The primary focus of this study is to evaluate the study abroad program learning outcomes by measuring change in professional attitude toward the industry and technical packaging knowledge through pre- and post-surveys aligned with course-level learning outcomes.

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Experiential learning, as conceptualized by Kolb (1984), is defined in this study as a cyclical process in which learners gain knowledge through concrete experience, reflecting on those experiences, forming abstract concepts, and actively testing those concepts in new situations. Passarelli and Kolb (2012) extend this framework to the context of education abroad, emphasizing that the combination of immersive cultural experiences and intentional reflection enhances both student learning and personal development. This approach is especially effective in professional education, where students engage in real-world environments and reflect on their learning to build deeper understanding. Study abroad programs offer unique platforms for such engagement, providing cross-cultural experiences that enhance students' personal and professional competencies (Vande Berg et al., 2009). These experiences foster critical thinking, adaptability, and intercultural communication which are skills essential in an increasingly interconnected world (Hadis, 2005; Paige et al., 2009). Research has also shown that study abroad participants demonstrate higher academic engagement, cultural intelligence, and factors that translate into improved career readiness (Braskamp et al., 2009; Bott-Knutson et al., 2019).

Site visits bridge theory and practice by reinforcing classroom concepts through hands-on, real-world industry exposure and social interaction (Vygotsky, 1978; Roberts et al., 2018). Study abroad programs involving site visits enhanced students' ability to collaborate across cultures and adapt to varying professional norms, thereby preparing them for global careers (Ingraham & Peterson, 2004). Packaging is an interdisciplinary field that integrates principles from materials science, logistics, marketing, environmental science, and transportation to design and deliver functional, sustainable, and efficient packaging solutions. In professional disciplines like "packaging," where global supply chains and diverse consumer demands require complex solutions to solve challenges, international exposure could provide valuable insights into material usage, sustainability practices, and regulatory requirements. For students in packaging, such experiences strengthen the theoretical foundation of course content (e.g., polymer properties, supply chain management, or environmental impact assessment) and bridge the gaps between packaging courses by offering real-world contexts where these diverse areas intersect. The benefits of experiential learning through study abroad extend beyond technical skills. Studies have shown that students engaged in such programs report growth in self-confidence, cultural empathy, and problem-solving abilities (Stebleton et al., 2013; Nguyen et al., 2017). Immersive experiences encourage students to challenge preconceived notions and embrace diverse perspectives, enriching their personal and professional lives (Deardorff, 2006; Salisbury et al., 2013).

This research builds on the growing body of literature on short-term study abroad and experiential learning by examining the impact of the "Packaging in Korea and Japan" program, a faculty-led, discipline-specific experience designed to enhance students' global awareness and professional competencies (Iskhakova & Bradley, 2022; Strange & Gibson, 2017). The course is expected to

enhance two categories of learning outcomes: (1) cultivating a global perspective and a professional attitude toward the packaging industry, and (2) enhancing knowledge in packaging through experiential learning. To achieve these goals, the program integrated Kolb's experiential learning theory with extensive packaging industry site visits under the study abroad program setting (See Figure 1). Surveys and reflections were used for qualitative and quantitative assessment of the development of a professional attitude. For the assessment of packaging knowledge enhancement, essays and targeted site visit surveys designed to measure class learning outcomes (CLOs) achievement.

The demographic profile of this study abroad program for Summer 2024 includes a diverse group of 18 students with a range of academic levels, majors, and genders as shown in Figure 2. This range allows for a mix of perspectives, with freshman and sophomores gaining early exposure to international packaging practices, while seniors and graduate students leverage the program as a culmination of their academic and professional development. In terms of gender, the group includes both male and female students 50% each, and the majority of participants are pursuing degrees in packaging, while some come from related fields such as supply chain management.

Study Methods

Method Part One: Measuring Global Perspective and a Professional Attitude Toward the Packaging Industry

The first part of the study utilized quantitative approaches to assess the changes in students' attitudes towards global professionalism through the study abroad program. Data collection involved administering two surveys: an initial survey at the beginning of a study abroad program and a final survey at the end. The surveys were designed with likert-scale questions as well as open ended questions to allow measurement of expectations and outcomes associated with the overarching study abroad program contributing to a deeper understanding of students' professional attitudes with a global perspective.

The initial survey is designed to comprehensively assess students' expectations and self-perceived readiness for the study abroad program. The questions target several key areas: 1) excitement and satisfaction, 2) cultural knowledge and communication, 3) personal and academic growth, 4) willingness to step out and self-reflection, and 5) adaptability and challenge. These domains reflect the affective, cognitive, and behavioral dimensions of growth, and were informed by Kolb's (1984) experiential learning theory and Passarelli and Kolb's (2012) application of the model to education abroad. A total of 18 Likert-scale questions prompt students to rate their responses on a five-point scale, ranging from low to high levels of agreement or confidence. This structured approach captures baseline data on students' attitudes and expectations, which will later enable meaningful comparisons with post-survey results to measure changes resulting from the study abroad experience.

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Figure 1

Packaging in Korea and Japan Study Abroad Design Diagram Integrating Experience Learning (EL) Theory: Evaluation methods (Left) and Flow charts (Right).

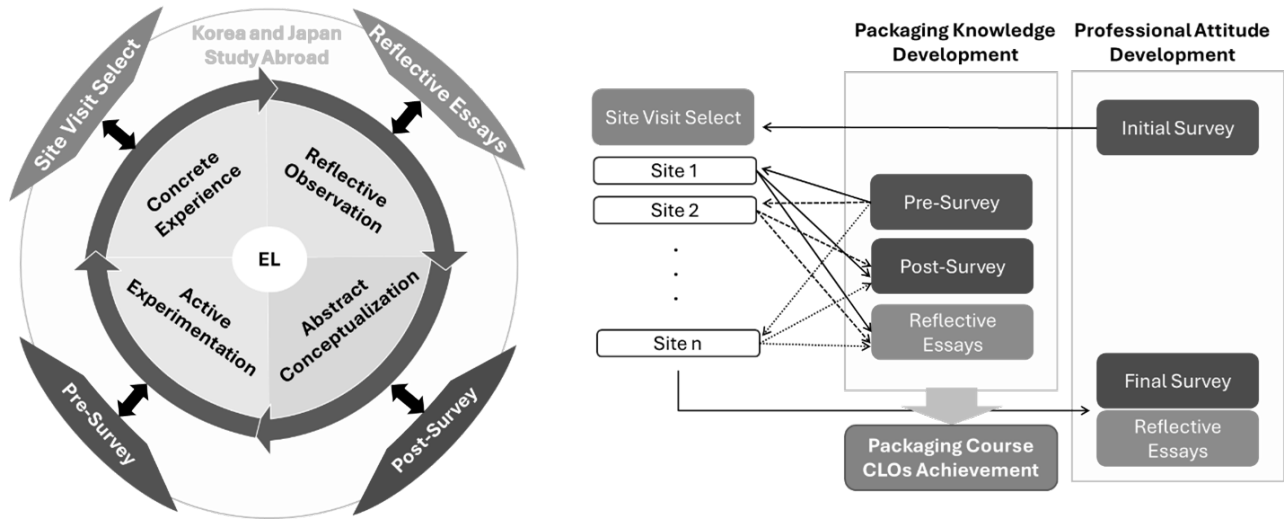
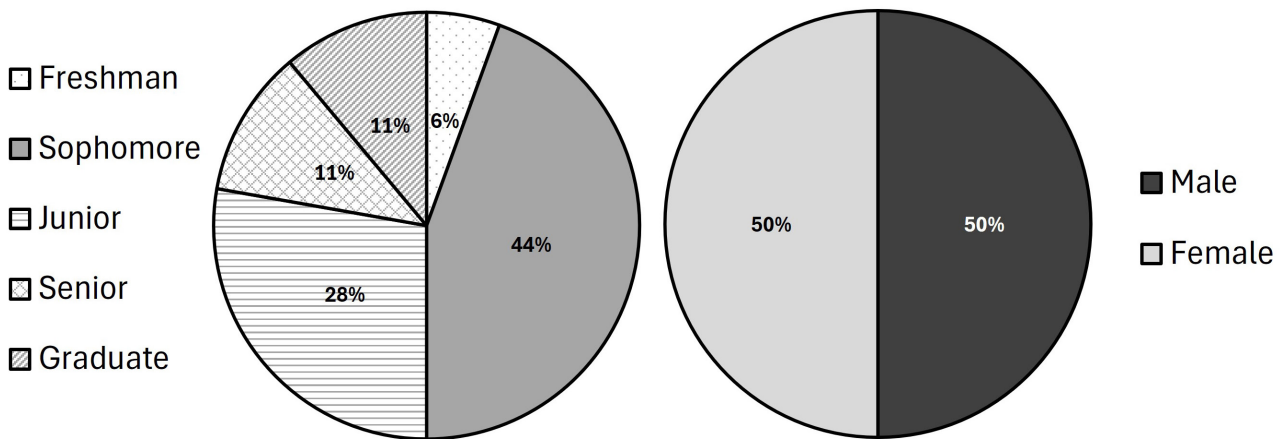


Figure 2

Demographics of the Participants.



The final survey was structured to encourage students to reflect deeply on their overall experiences, providing valuable insights into how well the program met their initial expectations and goals. Like the initial survey, it includes 20 Likert-scale questions to assess areas similar to the pre-survey areas. These questions allow students to evaluate their development across various competencies and to reflect on how effectively they adapted within the immersive cultural context of the program. As in the initial survey, questions were organized into five key categories. The survey was administered through the university's Desire2Learn (D2L) management system. All 18 students who participated in the program completed both the pre- and post-surveys, resulting in a 100% response rate. Paired-sample t-tests were conducted to compare initial and final survey mean scores for each category, with statistical significance determined at $p < 0.05$; however, given the small sample size, these results are interpreted as exploratory indicators of within-group change rather than generalized conclusions to a broader population. To capture insights beyond what standardized

questions can measure, the survey also incorporates open-ended questions for qualitative analysis. These allow students to describe any personal or academic developments in their own words, providing space for responses that may not be fully conveyed through predefined scales. The open-ended responses enrich the data by revealing unique perspectives, unexpected learning experiences, and personal reflections (Bleske-Rechek et al., 2022) that illustrate the program's impact on areas such as self-confidence, cultural sensitivity, and academic curiosity. By combining Likert-scale items with open-ended questions, the survey allows for a comprehensive evaluation of the program's impact. This dual approach captures both measurable outcomes (e.g., specific skills gained) and more nuanced qualitative aspects of growth, offering a holistic understanding of students' experiences and the program's overall effectiveness.

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Method Part Two: Enhancing Knowledge in Packaging

In addition to the packaging professional attitude development assessment, the enhancement of the student's packaging knowledge survey was designed to evaluate student class learning outcomes through a series of pre- and post-packaging related site visits. These surveys also utilized the D2L online survey tool. The surveys were given before and after each visit, allowing students to self-assess their knowledge in relation to the specific site they are visiting and to reflect on what they have learned. The survey questions were aligned with the class learning outcomes (CLOs) of corresponding discipline-specific courses from the Michigan State University (MSU) School of Packaging (SoP) curriculum (Auras et al., 2023). These questions utilized a 5-point Likert scale aligned with the course's specific CLOs, where 1 = I have no knowledge, 2 = I recognize some key terms, 3 = I grasp some basic concepts, 4 = I possess general information, and 5 = I am very familiar with the subject.

This is a key component to the uniqueness of this study because the CLOs are already being measured for on campus learning, whereas, we are now using the same classroom objectives to measure enhancements from field inquiry abroad. A brief background on CLOs is described next. Table 1 illustrates the alignment of each site visit with the packaging courses, ensuring the packaging site visit

reinforces the core competencies and learning outcomes outlined in the MSU SoP curriculum.

Class Learning Outcome (CLO) Mapping in the School of Packaging at Michigan State University

The CLOs serve as essential indicators of student achievement, providing measurable goals that align with academic and professional competencies. Recognizing their importance, the MSU SoP initiated a CLOs mapping project in 2018 to establish clear learning objectives across its curriculum. This initiative began with core packaging courses, expanding to elective courses by fall of 2020. The structured mapping of CLOs reflects the School's commitment to a comprehensive education model that includes competency-based education while also supporting broader cognitive, affective, and reflective learning goals. This approach ensures alignment with both department-level competency-based programmatic learning outcomes (CPLOs) and university-level Michigan State University Learning Goals (MSU-LGs).

The MSU SoP curriculum consists of core and elective courses, each with designated CLOs that contribute to comprehensive learning outcomes for the discipline. Core courses provide foundational knowledge in key areas such as material science, packaging dynamics, and process management, while electives offer specialized knowledge in fields like medical, food, and hazardous materials packaging. Table 2 illustrates the structure

Table 1

Class and Site Visit Mapping.

PKG Course Number (PKG)	Japan						Korea						
	HE-Log.1	CONF. & Bev1	HE-Log.2	E-Com. 1	Bev.2	Recyc.1 & Recyc.2	CPGs1 & CPGs2	Recyc.3	Paper Mill	Food1 & Food2	Glass bottle MFr.	Food3	E-Com. 2
101													
102													
221													
315													
322													
323													
410													
411													
432													
465													
485													
430													
452													
455													
456													
470													

HE-Log.: Heave Equipment Logistics, CONF.: Confectionery, Bev.: Beverage, E-Com.: E-commerce, Recyc.: Recycling, CPGs: Consumer Packaged Goods, MFr.: Manufacturer.

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of both core and elective courses within the SoP. The CLOs in each course are systematically mapped to the School's CPLOs, ensuring that the curriculum supports defined competencies crucial for professional success in packaging. This alignment extends to MSU-LGs, facilitating the integration of department-specific outcomes with the overarching objectives of MSU's educational framework. Figure 3 illustrates the mapping of class-level CLOs to both departmental and university learning outcomes, highlighting the structured approach adopted by the school to achieve alignment at multiple academic levels (Auras et al., 2023). As an example, PKG432 CLOs are shown in Table 3.

In this study, CLOs play a central role in the design of the evaluation instruments. By aligning the pre- and post-site visit surveys with the CLOs of corresponding courses, we were able to measure student learning in a way that is directly linked to the School's academic standards. This approach allows for an evaluation that is both discipline-specific and integrative, reflecting not just individual student gains but also reinforcing the broader goals of the curriculum. It ensures that the study abroad experience is evaluated not as a stand-alone activity but as an embedded component of students' academic development within the SoP's competency-based education framework.

Evaluation Design: Connecting on campus CLOs with Site Visits

Faculty carefully chose core classes that aligned with each site visit to evaluate if the student gained knowledge beyond their classroom learning. For example, during the paper mill site visit, students learned about current efforts to develop paper-based packaging that could replace polymer-based packaging and participated in discussions on the current challenges. Students also toured the paper mill manufacturing process. These experiential learning activities are directly related to PKG 315 and PKG 322. Therefore, in the pre-site visit survey, students were asked about their confidence levels in both PKG 315 and PKG322 CLOs before the site visit. After the visit, the same questions were posed to measure improvements in students' confidence in the CLOs. Figure 4 shows an example of

CLOs related questions in the post-site visit survey. The data collected from these pre- and post-visit questions enable a comparative analysis of change in students' self-reported confidence related to CLO-aligned concepts after each site visit, providing insight into perceived learning gains across the program. Additionally, open-ended questions were included in the post-visit surveys to understand individual student perspectives.

We processed and analyzed the pre- and post-survey results using the R statistical software v. 4.3.1 (R Core Team, 2023). Linear mixed effects models (LMEMs) were employed to test the fixed effects of question types, pre-post course, and their higher order interactions. We included varying intercepts for students in our models as random effects. We chose to employ LMEMs to our dataset as they are robust even with ordinal responses (Norman, 2010). Each core CLO was analyzed separately, with the fixed effects of question types and pre-post course and their higher order interactions, to test how the question types and pre-post course delivery affected student learning. When a course was included in several site visits, for instance, PKG 410, we also included an additional fixed effect of site in our models along with all higher order interactions. We assumed that the model residuals followed normal distribution with zero mean and some variance σ^2 . The data were subjected to LMEMs using the lme4 package (Bates et al., 2014). Model assumptions of linear mixed models were assessed visually by constructing residual vs fitted plots for heteroskedasticity, and QQ plots of normality of residuals. Analysis of variance (ANOVAs) were constructed using the car package (Fox & Weisberg, 2018). Model residuals were checked for mean shifting outliers using functions from the car package. If the ANOVAs revealed significant differences between the fixed effects, post hoc tests were conducted next. Estimated marginal means along with 95% CI were calculated using the emmeans package (Lenth et al., 2018). Letters of significance between fixed effects at the significance level of 0.05 were obtained from *multcomp* package (Hothorn et al., 2008). For instance, if the letters differ between pre- and post-survey results (a & b), it indicates a significant difference at the 0.05 level.

Table 2

The Current School of Packaging Curriculum Including Core and elective Courses.

Packaging Core Courses	Packaging Elective Courses
PKG101: Principles of PKG	PKG421: Virtual Packaging Design
PKG102: Introductory PKG Seminar	PKG430: PKG for FMCGs
PKG221: PKG with Glass and Metal	PKG452: Medical PKG
PKG315: PKG Decision Systems	PG455: Food PKG
PKG322: PKG with Paper and Paperboard	PKG456L Perishables
PKG323: PKG with Plastics	PKG470: PKG Sustainability
PKG410: Distribution PKG Dynamics	PKG477: Hazmat PKG
PKG 411: Package Develop. Technology	PKG480: PKG Laws and Regulations
PKG432: PKG Process	PKG 490: Special Topics
PKG465: PKG Value Chain	PKG493: Internship
	PKG499: Undergraduate Research

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Figure 3

PKG Class CLOs Mapping to Department and University Levels (Auras et al., 2023).

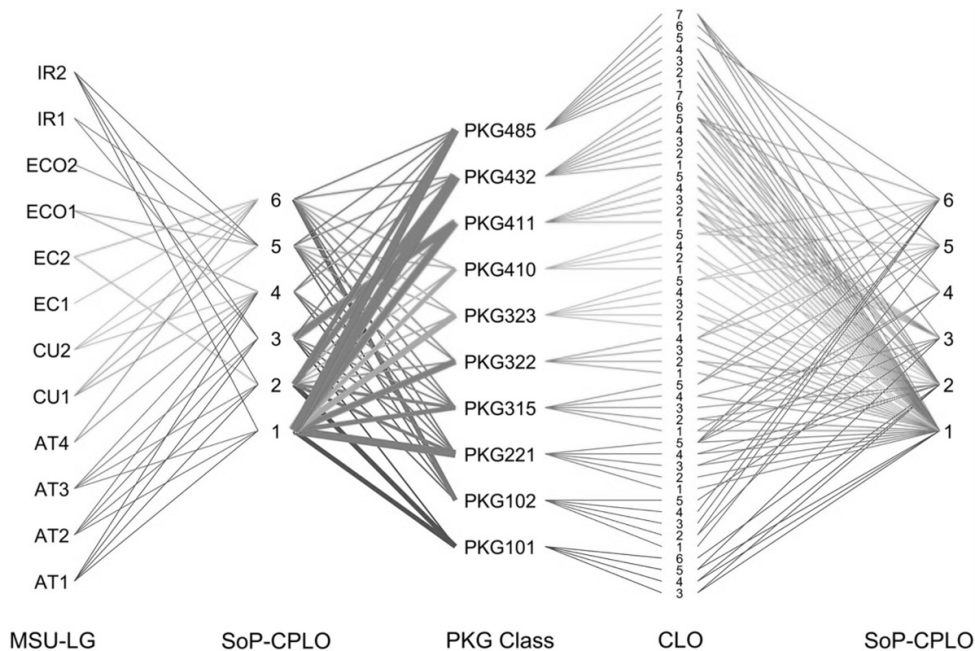


Table 3

PKG432 Packaging Processes Class Learning Outcomes (CLOs) Example.

CLOs	Description
PKG432-1	List, recognize, recall and classify packaging line operations, packaging machinery, and process analysis of standards.
PKG432-2	Identify machinery needs and determine acceptable models for use.
PKG432-3	Check, appraise, validate, determine, and recommend process specifications.
PKG432-4	Select, integrate, and assemble efficient cleaning/filling/sealing/labeling/casing/coding/palletizing operations for product/package systems.
PKG432-5	Generate/design and schematize requisite process flow.
PKG432-6	List and check regulatory requirements and provide/determine appropriate procedures to meet them.
PKG432-7	Check and reflect on operational steps to ensure product, package and process quality.

Figure 4

Post Site Visit Survey Example with Corresponding CLOs.

PKG322: Packaging with Paper and Paperboard

1 - I have no knowledge. 2 - I recognize some key terms. 3 - I grasp some basic concepts. 4 - I possess general information. 5 - I am very familiar with the subject.

#	Statement	1	2	3	4	5	N/A
1	CLO1- Understand the structural, chemical and physical properties of wood, paper, and paperboard packaging materials.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	CLO2 - Select appropriate wood, paper and paperboard packaging designs to meet product's requirements and packaging cost.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	CLO3 - Apply and interpret materials tests for wood, paper, and paperboard packaging materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	CLO4 - Demonstrate competence in laboratory skills by evaluating wood, paper, and paperboard packaging materials by creating lab reports and explaining laboratory test results	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Study Results

Part One: Assessing Global Professionalism and Packaging Knowledge Throughout Study Abroad Program

The study abroad survey analysis for professional attitude development is organized into five key categories: Excitement and Satisfaction, Cultural Knowledge and Communication, Personal and Academic Growth, Willingness to Step Out and Self-Reflection, and Adaptability and Challenges. These categories are not specific to each site, but are significant in assessing the impact on the overall study abroad program in Korea and Japan. The study was focused on the difference between pre- and post- surveys in these categories and the results are shown in Table 5. In the *Excitement and Satisfaction* category, participants began the program with a high level of enthusiasm, as indicated by the pre-survey score of 4.84, and maintained this excitement throughout, reflected in the post-survey score of 4.77. The t-test showed no statistically significant difference, suggesting consistent engagement from the outset. Although some students pointed out minor logistical challenges, qualitative feedback further supported these findings, with most describing the high level of satisfaction and consistently positive experiences throughout the program.

Participants showed the most significant growth in the *Cultural Knowledge and Communication* category. The pre-survey overall rating of 2.64 indicated relatively low familiarity with the host country culture and language, while the post-survey score increased dramatically to 3.70 ($p < 0.001$). The results underscore that the program fostered cultural learning and enhanced students' communication skills across cultural contexts, which are attributed to immersive experiences and structured interactions. Qualitative responses supported this improvement as students shared their personal experiences of engaging with locals, overcoming language barriers, and learning about cultural norms through meaningful interactions. Students described their increased understanding of the recycling and sustainability efforts in Japan and Korea. Participants were particularly impressed by how these countries' unified approach to waste management, driven by both citizens and governments, differed from the U.S.

Personal and Academic Growth also showed a statistically significant increase from 3.90 to 4.38 ($p < 0.001$). The data suggests that students experienced meaningful development in both personal and academic domains during the program, which aligns with the program emphasis on experiential learning and reflective practices. Qualitative reflections revealed that students consistently mentioned the value of site visits to packaging companies, where they observed packaging processes firsthand. These experiences provided insights that went beyond classroom learning and it allows students to see real-world applications of their academic knowledge. Many also noted that the program broadened their worldview and influenced their career aspirations, particularly in the areas of sustainability and packaging innovation.

For the *Willingness to Step Out and Self-Reflection*, the mean scores before and after the program were 4.02 to 4.20, showing little change ($p=0.340$). This indicates that the students who participated in this program had already established a willingness to engage in self-reflection and step out of their comfort zones prior to the program.

The *Adaptability and Challenges* category showed substantial improvement, with the pre-survey rate of 4.12 rising to 4.51 in the post-survey. The t-test results ($p=0.002$) highlight the effectiveness of the program in enhancing students' adaptability and ability to navigate challenges, likely facilitated by the dynamic and unfamiliar environments they encountered. Students shared stories in their qualitative responses about adjusting to new environments, handling unexpected challenges, and developing problem-solving skills. Many participants reflected on how overcoming these obstacles boosted their self-reliance and adaptability, skills they believe will be valuable in future endeavors.

Overall, the data demonstrated the impact of the program on students' cultural knowledge, personal growth, and adaptability, while maintaining their initial excitement and satisfaction levels. These findings suggest that immersive study abroad experiences can significantly contribute to intercultural competence and personal development.

Part Two: accessing Knowledge in Packaging Discipline Throughout Study Abroad Program

This section addresses the second focus of the study: evaluating students' knowledge across key packaging topics gained through experiential learning.

Enhancement of Knowledge in Packaging Materials

The visit to the 'packaging materials' sites included a total of 8 visits to glass packaging production, fiber-based material applications, and polymer recycling (Table 4). These site visits directly contributed to the improvement of the CLOs in material courses, as reflected in the post-survey results compared to the pre-site visit survey. The experiential site visit learning opportunities helped solidify students' understanding of manufacturing, sustainability, and innovative waste reduction technologies, leading to significant gains in their knowledge of packaging materials

Table 4

Course Categorization based on Subjects.

Subject	School of Packaging Undergraduate Course
Materials	PKG221 Packaging with Glass and Metal
	PKG322 Packaging with Paper and Paperboard
	PKG323 Packaging with Plastics
Logistics	PKG410 Distribution Packaging Dynamics
	PKG465 Packaging Value Chain
Process	PKG315 Packaging Decision System
	PKG432 Packaging Process
Others	PKG455 Food Packaging
	PKG 465 Packaging and Shelf Life of Perishable Food
	PKG470 Packaging Sustainability

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and their applications required as a CLO in the School. CLO 3 in PKG 221, which focuses on material testing across glass, metal, fiber, and polymer materials, showed a notable improvement, as students were able to see the real-world processes involved in these materials' production and evaluation. Notably, CLO 4 in PKG 221, which focuses on "understanding how glass and metal packages are constructed and filled" showed significant improvement. This improvement could be attributed to the visit to the glass manufacturing facility in Korea, where students experienced raw material handling to glass bottle manufacturing and the final filling process. By absorbing these steps firsthand, students gained a deeper understanding of the production cycle, which reasonably led to significant improvement in their learning outcomes for this specific course objective. Additionally, CLO 4 for PKG 322 and PKG 323, which is related to the testing and evaluation of these materials, also demonstrated a marked increase in post-survey scores. These hands-on experiences deepened their understanding of material properties, testing methods, and the importance of sustainability in packaging, greatly enhancing their overall learning outcomes from the course. The qualitative feedback from students highlights the site visits significantly improved their CLOs, providing real-world context that reinforced their theoretical knowledge. At the glass bottle manufacturer in Korea, students gained firsthand experience of the entire glass production process, from raw materials to finished bottles, and observed the use of various molds in high-volume production. One student noted, "Seeing how glass was made in person was so cool and informative. It definitely opened my eyes more to think about what specifications are needed when designing a glass bottle because of the production process." This exposure deepened their understanding of material testing and production processes, directly aligned with CLO 3, which focuses on material properties and testing methods. Seeing these processes in action reinforced concepts learned in courses like PKG 221. Additionally, the site visit to glass bottle manufacturer allowed students to observe the filling process, which greatly enhanced their grasp of how glass packages are constructed and filled, aligning with CLO 4 in PKG 221.

Visits to recycling facilities in Japan further enriched students' understanding of sustainable packaging practices, specifically through exposure to advanced polymer recycling technologies. These visits improved their comprehension of designing packaging with recyclability in mind, particularly in PKG 323, where sustainability is a key focus. Moreover, the visits helped bridge the gap between classroom learning and practical application. For instance, the tour of a paper mill gave students a closer look at fiber material production, which reinforced their understanding of fiber packaging's practical uses. These experiences allowed students to apply the theoretical knowledge gained in class to real-world scenarios, thus improving CLOs related to material evaluation and packaging system design. Overall, the site visits provided students with critical hands-on experiences that enriched their understanding of material properties, production processes, and sustainable packaging solutions, significantly enhancing their learning outcomes.

Enhancement of Knowledge in Logistics Processes

During the study abroad program, students explored packaging logistics at various sites, gaining insights into distribution and supply chain management. Visits included heavy equipment packing facilities, showcasing how robotic packaging is optimized for shipping, and an e-commerce center in Japan, where students learned about last-mile delivery and damage prevention. In Korea, they visited an e-commerce research center, observing large-scale logistics and sustainable delivery coordination.

For PKG 410 Distribution Packaging Dynamics, Figure 6 illustrates significant improvements in several key learning outcomes (CLOs) after the site visits. The comparison between pre- and post- scores shows that students' understanding of critical concepts like selecting appropriate materials to protect against distribution hazards (CLO 1) and evaluating trade-offs between packaging materials, cost, and effectiveness (CLO 2) improved considerably. The post-treatment scores generally exhibit higher means, indicating that after completing the site visits, students had a better grasp of these concepts. Additionally, the course seems to have effectively enhanced students' ability to evaluate package performance during distribution (CLO 4) through lab reports and tests, as indicated by the substantial improvement in the related categories.

Table 5

Professional Attitude Development Study Results.

Category	Pre-Survey		Post-Survey		T-Statistic	P-Value
	Overall Rate	Standard Deviation	Overall Rate	Standard Deviation		
Excitement and Satisfaction	4.84	0.36	4.77	0.42	0.76	>0.1
Cultural Knowledge and Communication	2.64	1.22	3.70	1.38	-4.60	<0.05
Personal and Academic Growth	3.90	0.90	4.38	0.72	-4.16	<0.05
Willingness to Step Out and Self-Reflection	4.02	0.93	4.20	0.96	-0.96	>0.1
Adaptability and Challenges	4.12	0.68	4.51	0.85	-3.18	<0.05

Overall Rate is based on a 5-point scale (1 = low, 5 = high).

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For PKG 465 Packaging Value Chain Management, the data reflects similar advancements in student learning outcomes. Notably, there is a strong improvement in students' ability to apply business concepts to packaging decisions, including financial analysis of the value chain (CLO 1). The increase in post-survey scores suggests that students better understood how packaging functions in both national and international distribution systems (CLO 2) and developed stronger skills in creating optimized packaging strategies for various distribution networks (CLO 3). Furthermore, the noticeable enhancement in the scores related to evaluating quality and trade-offs in distribution (CLO 4) highlights how the course intervention succeeded in deepening students' understanding of complex trade-offs between cost, quality, and sustainability in the packaging supply chain.

At heavy equipment packaging and distribution companies in Japan, students observed how manufacturing robots are used to prepare packaging for distribution. This hands-on experience significantly enhanced their understanding of key concepts in PKG 410, such as selecting appropriate materials to protect products from distribution hazards (CLO 1). One student remarked, *"Seeing the automation in action helped me realize how important material choices are for ensuring the product reaches the customer undamaged."* The experience also helped them grasp how to evaluate package performance during distribution, which directly aligns with CLO 4.

At e-commerce distribution centers in both Japan and Korea, the focus was on integrating packaging with last-mile delivery systems and minimizing transport damage. This visit strengthened the students' ability to evaluate the trade-offs between packaging materials, cost, and effectiveness, which is central to CLO 2 in PKG 410. Students gained a clearer understanding of how the final stage of distribution impacts packaging decisions. One student noted, *"The distribution center visit made me think about the importance of packaging in the last-mile delivery—how even small changes in packaging can prevent damage and reduce costs."* This experience also had a major influence on the learning outcomes of PKG 465, particularly in applying business concepts to packaging decisions (CLO 1) and creating optimized packaging strategies for distribution (CLO 3) and trade-offs between cost, quality, and sustainability (CLO 4). Overall, the combination of these site visits significantly bolstered students' practical understanding of both PKG 410 and PKG 465 learning outcomes, as they were able to directly see how theory is applied in real-world logistics and packaging systems.

Enhancement of Knowledge in Packaging Process

During the study abroad program, students engaged with various sites that provided insights into packaging processes, including operations involving filling, sealing, and labeling systems. Visits to facilities such as beverage bottling plants and automated food packaging lines were directly aligned with the learning objectives of PKG 315 (Packaging Decision Systems) and PKG 432 (Packaging Processes). Both PKG 315 and PKG 432 pre and post survey results are illustrated in Figure 7.

For PKG 315, significant improvements were observed in key learning outcomes. Students' ability to apply packaging-related software (CLO 1) improved as they observed real-world applications during site visits, which bridged the gap between planning concepts and practical execution. Similarly, their understanding of environmental assessments (CLO 3) increased after exposure to sustainable practices and recycling technologies. The program also enhanced their communication skills (CLO 5), as students presented reflections to peers and professionals, demonstrating better articulation and adaptability in diverse contexts.

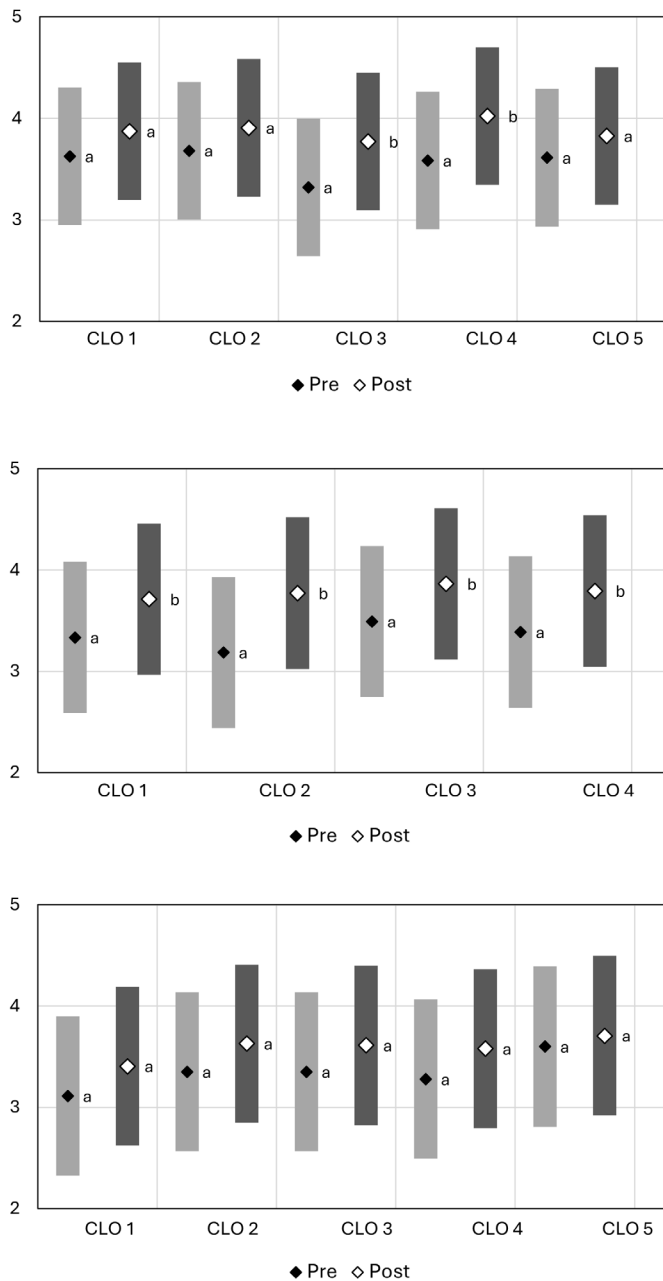
In PKG 432, the site visits provided practical insights into operational integration, with significant gains in CLO 4, which focuses on combining processes like filling and sealing. Observing high-speed packaging lines helped students better understand the complexities of process integration. Additionally, exposure to regulatory compliance protocols, such as cleanliness and quality control measures, improved students' understanding of compliance requirements (CLO 6). One participant noted, *"Seeing the pouches filled and sealed in real-time was amazing—it connected classroom theory to practical execution."* These experiences reinforced the application of academic concepts, enhancing the students' overall grasp of packaging processes.

The site visits provided valuable insights into packaging processes, emphasizing the integration of automation, quality control, and operational efficiency. Students observed advanced manufacturing lines for both rigid and flexible packaging, highlighting automated processes such as filling, sealing, and packaging with a focus on quality assurance through weight checks, scanners, and cameras. One student remarked, *"It was so effective and cool to see how the pouches were opened, filled, sealed, and packaged all on the same line."* Observing high-speed label production and advanced printing techniques further showcased precision in designing and integrating operations. These experiences bridged theoretical knowledge with practical applications, fostering a comprehensive understanding of packaging processes and reinforcing critical competencies. Overall, the study abroad program demonstrated significant success in enhancing students' knowledge and practical skills across the key CLOs for PKG 432, effectively linking classroom learning to industry applications while offering an international context for their knowledge acquisition.

STUDY ABROAD PACKAGING LEARNING OUTCOMES

Figure 5

Pre- and Post- CLOs Survey Results for Material Courses: PKG221 (Top), PKG322 (Middle), and PKG323 (Bottom).



Enhancement of Knowledge in Other Packaging Concepts

Beyond packaging materials, logistics and process-focused courses, the study abroad program also supported learning outcomes in elective like PKG 455-Food Packaging, PKG 456-Packaging and Shelf Life of Perishable Food, and PKG 470-Sustainability in Packaging. The pre-and post-survey results for each CLOs are presented in Figure 7.

In PKG 455, students showed marked improvements in their understanding of food spoilage mechanisms (CLO 1) and the relationship between packaging and shelf life (CLO 4). Visits to Korean food packaging facilities provided a practical context for these concepts, enabling students to better grasp the intricacies of preserving food quality and comparing it to their own US-based experiences. Similarly, in PKG 456, site visits deepened students' understanding of the intrinsic and extrinsic factors affecting perishables' quality and safety (CLO 1). Students also improved their ability to use physical, chemical, and microbiological methods to determine shelf life (CLO 2), along with packaging technologies that extend shelf life (CLO 4). Observations of advanced preservation techniques reinforced students' ability to evaluate commercial packaging systems for perishables (CLO 6) and to design new systems for improved product longevity (CLO 7).

For PKG 470, the focus on sustainability was particularly impactful. Students gained a deeper understanding of sustainability concepts (CLO 1) and learned to evaluate environmental challenges associated with packaging systems (CLO 6). Exposure to life cycle assessment (LCA) methodologies and innovative recycling practices further enhanced their ability to assess the environmental impact of packaging systems. As one student reflected, "*Understanding sustainability on a global scale gave me a new perspective on balancing packaging innovation with environmental responsibility.*" These experiences demonstrated the program's effectiveness in bridging theoretical frameworks with real-world applications, equipping students with the skills and knowledge to address challenges in packaging systems sustainably.

STUDY ABROAD PACKAGING LEARNING OUTCOMES

Figure 6

Pre- and Post- CLOs Survey Results for Logistics Courses: PKG410 (Left), and PKG465 (Right).

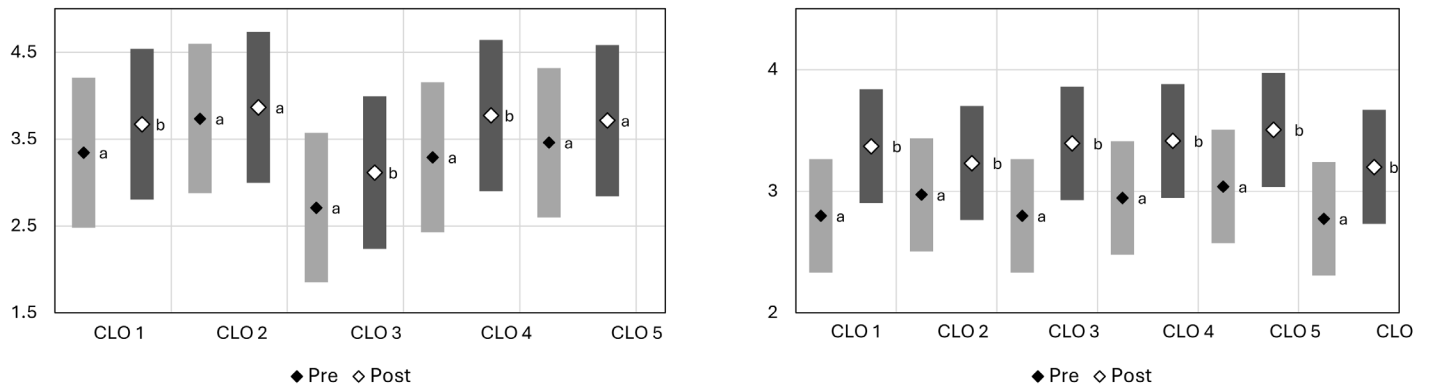
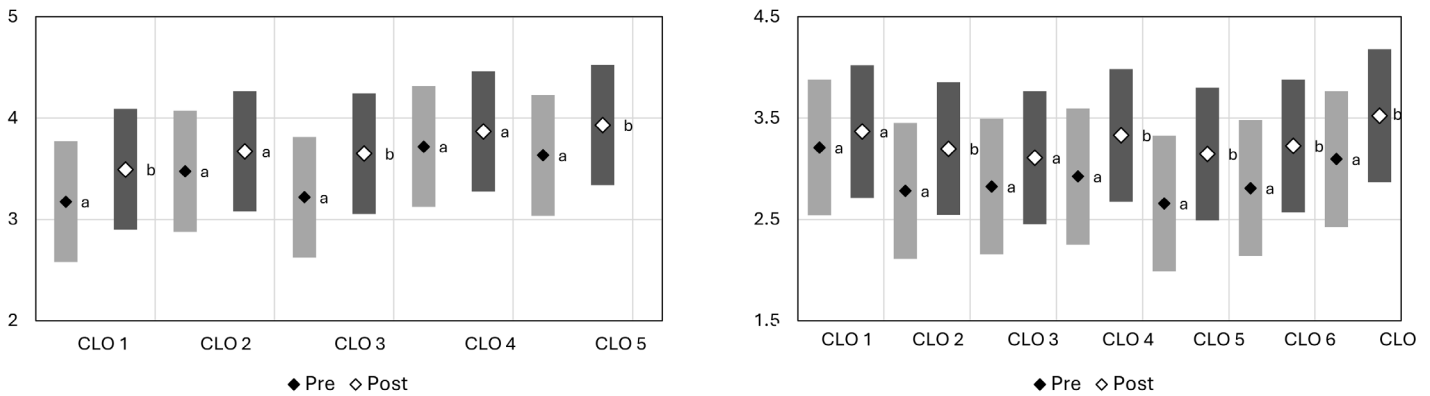


Figure 7

Pre- and Post- CLOs Survey Results for Packaging Process Courses: PKG315 (Left), and PKG432 (Right).



Conclusion

The "Packaging in Korea and Japan" study abroad program provides a compelling case for the transformative potential of experiential learning in higher education, particularly within professional disciplines such as packaging. Students reported significant growth in technical skills, such as understanding material properties, sustainability practices, and logistics, alongside enhanced professional attitudes, including adaptability, cultural sensitivity, and global perspective. These outcomes align with the study abroad program's objectives to cultivate both technical proficiency and holistic personal development, preparing students for the complexities of a global workforce. The program's impact on students' learning outcomes highlights the importance of integrating experiential learning frameworks into curriculum design. The observed improvement in CLOs across key areas, including packaging processes, materials, and logistics, underscores the value of hands-on experiences in solidifying theoretical knowledge. Moreover, the immersive nature of the program, featuring direct exposure to advanced manufacturing practices and sustainable innovations, encourages students to think critically about global industry trends and challenges. This aligns with broader experiential educational research, which emphasizes the role of active,

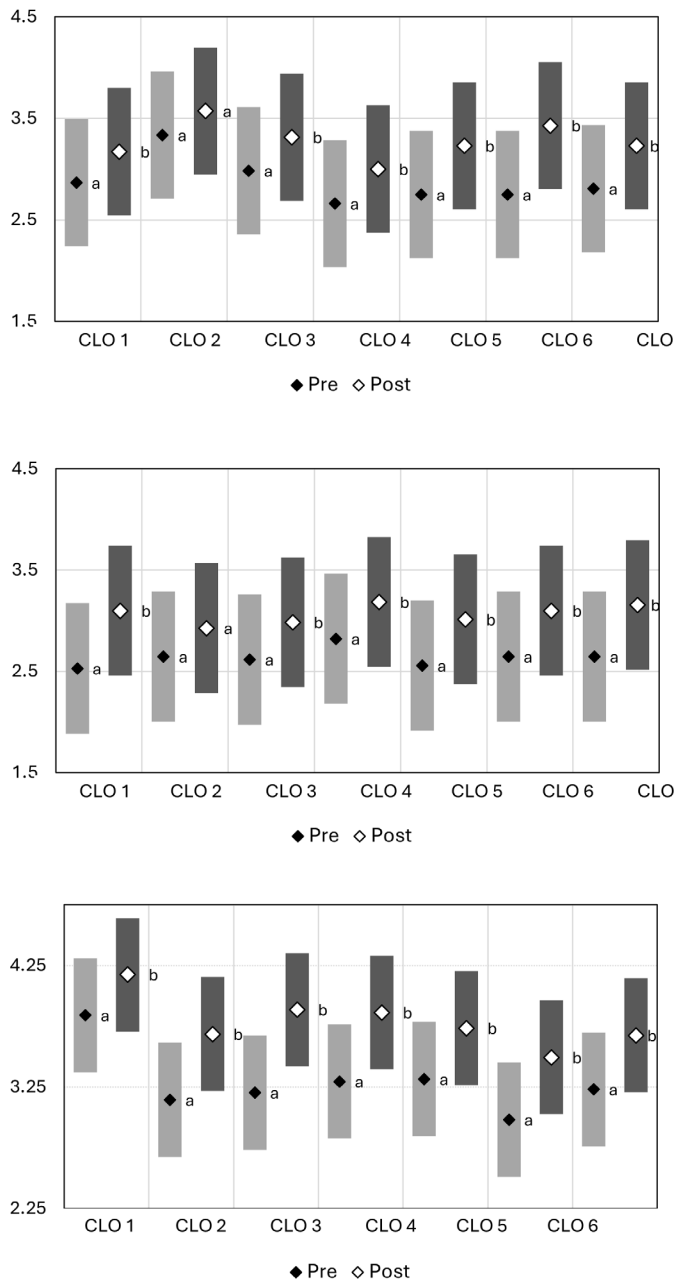
reflective learning in enhancing student engagement and retention. Additionally, the program fosters essential soft skills that are increasingly critical in a globalized professional landscape. These attributes not only benefit their immediate academic and career trajectories but also position them as future leaders in fostering collaboration and innovation in the packaging industry and beyond.

This study highlights the transformative potential of study abroad for experiential learning. As the first CLO-focused assessment in packaging, it provides a discipline-specific reference point and a model for related research. Future iterations can expand assessments, partnerships, and reflection to deepen impact, while the "Packaging in Korea and Japan" program demonstrates the broad educational, personal, and professional benefits of well-designed international experiences.

STUDY ABROAD PACKAGING LEARNING OUTCOMES

Figure 8

Pre- and Post- CLOs Survey Results for Other Courses: PKG455 (Top), PKG456 (Middle), and PKG470 (Bottom).



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