

KNOWLEDGE TRANSFER AS A KEY MEDIATOR IN TECHNOLOGY-ENHANCED INDUSTRY COLLABORATION AND OJT PLACEMENT OUTCOMES

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ABSTRACT: *On-the-job training (OJT) is an important form of work-integrated learning in Philippine higher education, but gaps between academic preparation and workplace practice may reduce its effectiveness. This study examined whether knowledge transfer mediates the relationship between technology-enhanced industry collaboration and OJT placement outcomes. An explanatory sequential mixed-methods design was used with 210 student interns from selected higher education institutions in the Zamboanga Peninsula during the academic year 2024-2025. Quantitative data from a researcher-developed questionnaire were summarized using descriptive statistics and examined through mediation analysis. Open-ended responses were analyzed thematically to explain the quantitative findings. Technology-enhanced industry collaboration ($M=3.47$), knowledge transfer ($M=3.75$), and placement outcomes ($M=3.82$) were rated to a great extent. Collaboration was strongly associated with knowledge transfer ($\beta=0.814$, $p<0.001$), and knowledge transfer was strongly associated with placement outcomes ($\beta=0.758$, $p<0.001$). The direct association between collaboration and outcomes remained significant ($\beta=0.202$, $p=0.001$), while the indirect effect through knowledge transfer was also significant ($\beta=0.617$, $p<0.001$), a pattern consistent with partial mediation. Qualitative findings highlighted the theory-practice gap, limited hands-on experience, technological misalignment, and the need for stronger industry partnerships and curriculum alignment. Knowledge transfer appears to be a central mechanism through which technology-enhanced industry collaboration supports skill acquisition, job readiness, and satisfaction. Digital platforms are most effective when combined with structured mentoring, authentic tasks, and sustained industry-academe coordination.*

Keywords: on-the-job training; knowledge transfer; technology-enhanced collaboration; higher education; employability

INTRODUCTION

On-the-job training (OJT) provides students with opportunities to apply academic knowledge in authentic work settings, develop employability skills, and become familiar with professional expectations. Work-integrated learning is most effective when placement activities are intentionally aligned with learning outcomes and when students receive meaningful opportunities to participate in workplace practice [1,2]. In Philippine higher education, OJT is embedded in many degree programs as a principal mechanism for connecting classroom instruction with industry experience.

Despite its value, OJT does not automatically eliminate the theory-practice gap. Students may enter placements with limited exposure to industry-standard technologies, insufficient opportunities for hands-on participation, or tasks that are weakly aligned with their specialization. Technology-enhanced collaboration can address some of these problems by supporting communication, real-time information sharing, virtual supervision, and collaborative project work. Evidence from technology-mediated internships, however, indicates that effective implementation also depends on adequate organizational support, purposeful task design, and sustained interaction between interns and supervisors [3].

Knowledge transfer provides a useful explanation for how collaborative arrangements are translated into learning outcomes. The SECI model describes knowledge creation through socialization, externalization, combination, and internalization [4], while the knowledge-based view emphasizes the integration and application of specialized knowledge within organizations [5]. Experiential learning theory further proposes that learning develops through the transformation of experience into reflection, conceptual

understanding, and active experimentation [6]. Together, these perspectives suggest that technology can facilitate access and coordination, but mentoring, guided practice, and knowledge exchange are necessary for students to convert workplace exposure into usable competence.

This study therefore examined the mediating role of knowledge transfer in the relationship between technology-enhanced industry collaboration and OJT placement outcomes among student interns in the Zamboanga Peninsula. It also identified implementation challenges and student-proposed strategies for strengthening OJT programs.

Methods

Research Design

The study used an explanatory sequential mixed-methods design, in which quantitative findings were followed by qualitative analysis to provide contextual explanation [7]. The quantitative phase used a descriptive-predictive approach to assess technology-enhanced industry collaboration, knowledge transfer, and OJT placement outcomes. The qualitative component examined open-ended responses concerning implementation challenges and possible program improvements.

Setting and Participants

Participants were 210 student interns from selected higher education institutions in the Zamboanga Peninsula during academic year 2024-2025. Institutions were purposively selected based on Commission on Higher Education recognition, the presence of structured OJT programs, and active industry partnerships that used digital platforms. Students were included based on their participation in technology-enhanced OJT placements.

Instrument and measures

Data were collected using a researcher-developed questionnaire informed by the SECI model [4], the knowledge-based view [5], and experiential learning theory [6]. The instrument measured three principal constructs: technology-enhanced industry collaboration, knowledge transfer, and OJT placement outcomes. Quantitative items used a five-point Likert scale. The questionnaire underwent expert review and pilot testing, and all construct scales obtained Cronbach α coefficients greater than 0.97, indicating excellent internal consistency. Open-ended items were included to elicit students' experiences of implementation challenges and their recommendations for improvement.

Data analysis

Means were used to summarize the extent of technology-enhanced collaboration, knowledge transfer, and placement outcomes. Mediation was evaluated through the estimated paths from collaboration to knowledge transfer, from knowledge transfer to placement outcomes, the direct path from collaboration to outcomes, and the indirect effect through knowledge transfer, consistent with the conceptual approach to mediation described by Baron and Kenny [8]. Qualitative responses were organized and interpreted through thematic analysis [9].

RESULTS

Descriptive findings

Students rated technology-enhanced industry collaboration to a great extent overall ($M=3.47$). Digital communication tools and real-time data sharing received the highest ratings within this construct, whereas virtual training and online collaborative projects were less consistently implemented. Knowledge transfer was rated to a great extent ($M=3.75$), with mentoring rated slightly higher than knowledge exchange. OJT placement outcomes were also rated to a great extent ($M=3.82$), with similarly high ratings for skill acquisition, job readiness, and satisfaction.

Table 1. Descriptive summary of the principal constructs and indicators

Construct or indicator	Mean	Interpretation
Technology-enhanced industry collaboration, overall	3.47	Great extent
Digital communication tools	3.62	Great extent
Real-time data sharing	3.54	Great extent
Online collaborative projects	3.38	Moderate implementation
Virtual training programs	3.32	Moderate implementation
Knowledge transfer, overall	3.75	Great extent
Mentoring	3.79	Great extent
Knowledge exchange	3.71	Great extent
OJT placement outcomes, overall	3.82	Great extent

Construct or indicator	Mean	Interpretation
Skill acquisition	3.83	Great extent
Job readiness	3.79	Great extent
Satisfaction	3.83	Great extent

Structural relationships and mediation

The structural model showed that technology-enhanced industry collaboration was strongly and significantly associated with knowledge transfer ($\beta=0.814$, $p<0.001$). Knowledge transfer was also strongly associated with placement outcomes ($\beta=0.758$, $p<0.001$). Although the direct association between collaboration and placement outcomes was smaller, it remained significant ($\beta=0.202$, $p=0.001$). The indirect effect through knowledge transfer was significant ($\beta=0.617$, $p<0.001$), indicating that knowledge transfer accounted for a substantial portion of the relationship between collaboration and outcomes. Because both the direct and indirect effects were significant, the findings were consistent with partial mediation.

Table 2. Structural paths and mediation results

Model path	β	p value	Interpretation
Technology-enhanced collaboration $\rightarrow$ knowledge transfer	0.814	<0.001	Significant positive association
Knowledge transfer $\rightarrow$ placement outcomes	0.758	<0.001	Significant positive association
Technology-enhanced collaboration $\rightarrow$ placement outcomes (direct effect)	0.202	0.001	Significant positive direct effect
Collaboration $\rightarrow$ knowledge transfer $\rightarrow$ placement outcomes (indirect effect)	0.617	<0.001	Significant indirect effect

Qualitative findings

The open-ended responses clarified the conditions that affected students' ability to benefit from OJT. The most frequently reported challenge was the disjunction between theory and practice, followed by limited hands-on experience and technological misalignment. Students' proposed solutions centered on stronger industry partnerships, access to industry-standard tools, closer curriculum-industry alignment, and expanded experiential learning opportunities.

Table 3. Reported challenges and proposed program improvements

Category	Theme	Frequency (n)
Challenge	Theory-practice disjunction	132

Category	Theme	Frequency (n)
Challenge	Limited hands-on experience	118
Challenge	Technological misalignment	104
Proposed improvement	Strengthen industry partnerships	156
Proposed improvement	Integrate industry-standard tools	142
Proposed improvement	Improve curriculum-industry alignment	138
Proposed improvement	Expand experiential learning opportunities	129

DISCUSSION

Knowledge transfer as the mechanism linking collaboration and outcomes

The findings indicate that technology-enhanced industry collaboration is associated with stronger OJT outcomes primarily when it enables students to acquire, exchange, and apply knowledge. The significant indirect effect was substantially larger than the remaining direct effect, suggesting that digital collaboration alone is insufficient. Communication platforms and real-time data sharing can improve access and coordination, but their educational value depends on whether they support guided participation, meaningful feedback, and opportunities to apply learning in authentic tasks.

This interpretation is consistent with experiential learning theory, which emphasizes that experience becomes educational when learners reflect on it, form concepts, and test their understanding in practice [6]. It also reflects the SECI model, particularly the importance of socialization and externalization in converting tacit workplace knowledge into forms that students can understand and use [4]. From a knowledge-based perspective, the value of university-industry collaboration lies not simply in access to technology but in the capacity of institutions, supervisors, and students to integrate specialized knowledge across organizational boundaries [5].

Mentoring and the continuing importance of human guidance

Mentoring received the highest rating within the knowledge-transfer construct. This finding reinforces the importance of supervisors who explain procedures, model professional practice, provide timely feedback, and help students connect academic concepts with workplace decisions. Even in technology-rich placements, human interaction remains central to learning. Digital tools should therefore extend the reach and consistency of supervision rather than replace structured guidance. This interpretation is also compatible with workplace learning scholarship, which emphasizes the interaction between the opportunities provided by the

workplace and the learner's active participation in practice [2].

Program gaps and implications for OJT design

The lower ratings for virtual training and online collaborative projects suggest uneven implementation across host organizations. Technology-enhanced OJT may be limited when organizations use digital tools mainly for communication rather than for purposeful training, collaborative problem solving, or authentic project work. The reported theory-practice disjunction and technological misalignment further indicate that students may encounter tools, workflows, and performance expectations that are not sufficiently represented in the curriculum.

The findings support a more integrated model of OJT in which higher education institutions and industry partners jointly define learning outcomes, select field-aligned tasks, establish mentoring expectations, and use digital platforms for documented feedback and progress monitoring. Such alignment may strengthen the employability benefits of work-integrated learning [1] while addressing the design and support requirements associated with technology-mediated internships [3].

Limitations

The study was conducted among student interns from purposively selected higher education institutions in one Philippine region and during one academic year. The findings therefore may not represent OJT experiences in other geographic areas, disciplines, or institutional settings. The principal measures were based on student self-reports, which may be influenced by recall, response tendencies, or shared-method effects. In addition, the very high internal consistency coefficients may warrant further examination of possible item overlap in subsequent instrument refinement. The mediation findings identify statistically consistent pathways but should not be interpreted as definitive causal evidence. Future studies may strengthen inference through longitudinal designs, multiple sources of outcome data, and discipline-specific comparisons.

Conclusion

Knowledge transfer was a key mechanism linking technology-enhanced industry collaboration with OJT placement outcomes. Collaboration was strongly associated with knowledge transfer, and knowledge transfer was strongly associated with skill acquisition, job readiness, and satisfaction. The significant direct and indirect effects indicated a pattern consistent with partial mediation. These results suggest that digital tools create value when they are embedded in structured mentoring, active knowledge exchange, authentic workplace tasks, and sustained coordination between higher education institutions and industry partners.

Recommendations

Higher education institutions should embed authentic experiential activities throughout the curriculum, provide students with exposure to industry-standard tools before deployment, and align OJT assessments with observable workplace performance. Industry partners should assign field-relevant tasks, formalize mentoring responsibilities, and provide regular feedback using appropriate digital platforms. OJT coordinators should ensure that placements match

students' specialization, monitor learning progress, and maintain systematic communication with host organizations. Policymakers and institutional leaders should support digital capacity building and sustained industry-academe partnerships. Future research should examine OJT outcomes longitudinally, compare experiences across disciplines, incorporate supervisor and employer assessments, and evaluate how emerging technologies affect workplace learning and knowledge transfer.

REFERENCES

- [1] Jackson D. Employability skill development in work-integrated learning: barriers and best practice. *Stud High Educ.* 2015;40(2):350-67. doi:10.1080/03075079.2013.842221.
- [2] Billett S. *Learning in the workplace: strategies for effective practice.* Crows Nest (NSW): Allen & Unwin; 2001.
- [3] Jeske D, Axtell CM. Going global in small steps: e-internships in SMEs. *Organ Dyn.* 2016;45(1):55-63. doi:10.1016/j.orgdyn.2015.12.007.
- [4] Nonaka I, Takeuchi H. *The knowledge-creating company: how Japanese companies create the dynamics of innovation.* New York: Oxford University Press; 1995.
- [5] Grant RM. Toward a knowledge-based theory of the firm. *Strateg Manage J.* 1996;17(S2):109-22. doi:10.1002/smj.4250171110.
- [6] Kolb DA. *Experiential learning: experience as the source of learning and development.* Englewood Cliffs (NJ): Prentice Hall; 1984.
- [7] Creswell JW, Plano Clark VL. *Designing and conducting mixed methods research.* 2nd ed. Thousand Oaks (CA): SAGE Publications; 2011.
- [8] Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol.* 1986;51(6):1173-82. doi:10.1037/0022-3514.51.6.1173.
- [9] Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006
- [10];3(2):77-101. doi:10.1191/1478088706qp063oa.