

Predicting teachers' digital resource integration: A comparative study of personal and contextual factors in Japan and Korea

Research Overview

This study examines what factors are associated with teachers' digital resource integration in Japan and Korea. Using TALIS 2024 teacher data and a Random Forest approach, it analyzes approximately 160 personal, pedagogical, and contextual variables. Key predictors included perceived utility, digital self-efficacy, and student-centered instructional practices, with country-specific differences between Japan and Korea.

Keywords: digital resource integration, pedagogical practices, cross-national comparison, TALIS 2024, Random Forest

Purpose of Study

This study aims to identify and compare factors associated with teachers' digital resource integration in Japan and Korea. Rather than testing a predefined causal model, it adopts an exploratory approach because teachers' digital resource use is likely shaped by multiple, interrelated factors, including digital readiness, instructional practices, assessment approaches, professional experiences, and school contexts. A machine learning approach allows these factors to be examined simultaneously and can detect complex, non-linear patterns that may be difficult to capture using conventional regression-based models.

The comparison between Japan and Korea is intended to explore both shared and country-specific predictors across two neighboring East Asian education systems. Although both countries have increased attention to digital education, they have differed in the recent pace and intensity of digital education policy initiatives (Horita, 2021; Lim et al, 2025; Ministry of Education, Culture, Sports, Science and Technology [MEXT], 2022; Ministry of Education, 2024). This comparison provides insight into whether similar factors are associated with teachers' digital resource integration across the two systems, and where country-specific differences emerge.

Methods

This study used both teacher and principal survey data from TALIS 2024 (<https://www.oecd.org/en/data/datasets/talis-2024-database.html>; OECD, 2025). The analytic sample included lower secondary teachers from Japan and Korea, with 4,563 teachers from Japan and 3,971 teachers from Korea. The outcome variable was teachers' reported use of digital resources in classroom instruction, operationalized with the 11 items representing a broad range of digital pedagogical practices, including direct instruction, providing digital feedback, supporting student collaboration, personalizing learning paths and assessment.

Approximately 160 predictor variables were examined covering teachers' demographic and professional characteristics, teaching experience, professional development participation, perceived utility of digital tools, digital self-efficacy, instructional practices, assessment practices, collaboration, workload, school climate, and contextual supports. Random Forest models were estimated separately for Japan and Korea to account complex and potentially non-linear associations among these variables, without requiring strong parametric assumptions. Model performance was evaluated using out-of-bag R^2 , RMSE and MAE, and variable importance was assessed using permutation and node impurity indices to identify the top predictors in each country.

Results and Discussion

The findings indicate that teachers' digital resource integration in both Japan and Korea was strongly associated with perceived utility, digital self-efficacy, and pedagogically meaningful instructional practices. Teachers who viewed digital tools as useful for teaching and learning and felt confident using them tended to report higher levels of digital resources integration. However, important predictors were not limited to digital readiness. Instructional practices that support self-directed learning, critical thinking, student reflection, and assessment as learning also emerged as salient predictors in both countries. This suggests that digital resource integration is closely connected to how teachers design learning activities and engage students as active participants in the learning process.

The country-specific results also revealed meaningful differences. In Japan, teachers' digital resource use was more strongly associated with age, teaching experience, and indicators of digital readiness. This pattern suggests that personal background and perceived preparedness may play a relatively prominent role in teachers' digital resource integration in the Japanese context. In Korea, by contrast, digital resource use was more strongly associated

with instructional practice variables, suggesting a closer link between technology use and pedagogical practices that emphasize active, student-centered, and competency-oriented learning.

These differences may be interpreted in relation to the two countries' recent digital education policy contexts. Korea has placed strong policy emphasis on digital transformation, AI-based education, and students' digital competencies in recent years, which may have contributed to a context in which digital resource use is increasingly connected to instructional design rather than treated as a separate technical activity. At the same time, the findings caution against interpreting digital integration simply as an outcome of policy emphasis or infrastructure (Lai et al., 2022). Across both countries, variables related to authentic learning support were more salient than purely administrative conditions such as working hours. Overall, the findings suggest that meaningful digital resource integration depends not only on teachers' digital readiness or external conditions (Hebibi et al., 2025), but also on their capacity to connect digital tools with authentic, student-centered learning (Hermita et al., 2023).

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