

Knowledge Management for Emergency Center Nurses' Clinical Performance: A Follow-Up Study of LMS-Based Training Graduates

Akiko NISHINO^{a,b}, Asuka KAWAGOE^b, Toshihiro KITA^b & Masashi TODA^b

^a*Tertiary Emergency Medical Center, Tokyo Metropolitan Bokutoh Hospital, Japan*

^b*Graduate School of Instructional Systems, Kumamoto University, Japan*

Abstract: This study aims to clarify how learning resources are utilized after training completion and to examine how LMS-based environments support knowledge use in clinical practice from a knowledge management perspective.

The participants were 20 nurses who had completed an LMS-based training program in an emergency medical center, and their post-training learning logs were longitudinally analyzed for at least three months. The results showed that eight participants continued to access learning materials on the LMS after course completion, typically around one-month post-training. The accessed materials included procedural checklists, learning resources, microlearning modules, confirmation tests. In contrast, twelve participants did not use the LMS after training, as clinical tasks could be performed using paper-based materials. These findings suggest that LMSs can function not only as training tools but also as knowledge support infrastructures that enable flexible and context-dependent use of learning resources in clinical practice.

Keywords: Emergency nursing education; Knowledge management; LMS; Learning logs; Job aids

1. Introduction

Nursing practice in emergency medical centers is performed in environments that require high levels of expertise and rapid decision-making. Therefore, nurses are expected not only to acquire knowledge and skills through training but also to effectively utilize necessary information during clinical practice.

Recent studies using Learning Management Systems (LMSs) and Learning Analytics (LA) have focused on visualizing learning processes, designing interventions, and analyzing learner behavior during training (Ngulube & Ncube, 2025; Pan et al., 2024; Saqr, 2018). Although analytical methods for improving user experience and learning outcomes in LMS environments have been extensively examined, limited empirical research has addressed how learning resources are reused and applied after course completion (post-course use).

From a knowledge management perspective, understanding how learning resources are utilized beyond training is essential for supporting knowledge use in real-world practice. However, review studies (Saqr et al., 2018) indicate that discussions on post-training material usage and knowledge management in practice settings remain insufficient.

Based on previous LMS-based training programs, this study aims to clarify how learning resources are utilized after training completion and how LMS-based environments support knowledge use in clinical practice by tracking post-training learning logs.

2. Methods

2.1 Participants

The participants were 20 nurses working in an emergency medical center who had completed LMS-based training.

2.2 Data Collection

Learning logs recorded in Moodle were collected for at least three months after course completion. Because the start date of learning varied among participants, the data collection period was set to ensure sufficient longitudinal tracking for all learners. As shown in Figure 1, the learning logs were tracked to examine whether learners who had completed the final examination continued to use the LMS during their on-the-job training (OJT) and independent practice phases. Access histories for learning materials and test attempts were analyzed. The figures are screenshots of Moodle, so the language in them is Japanese.

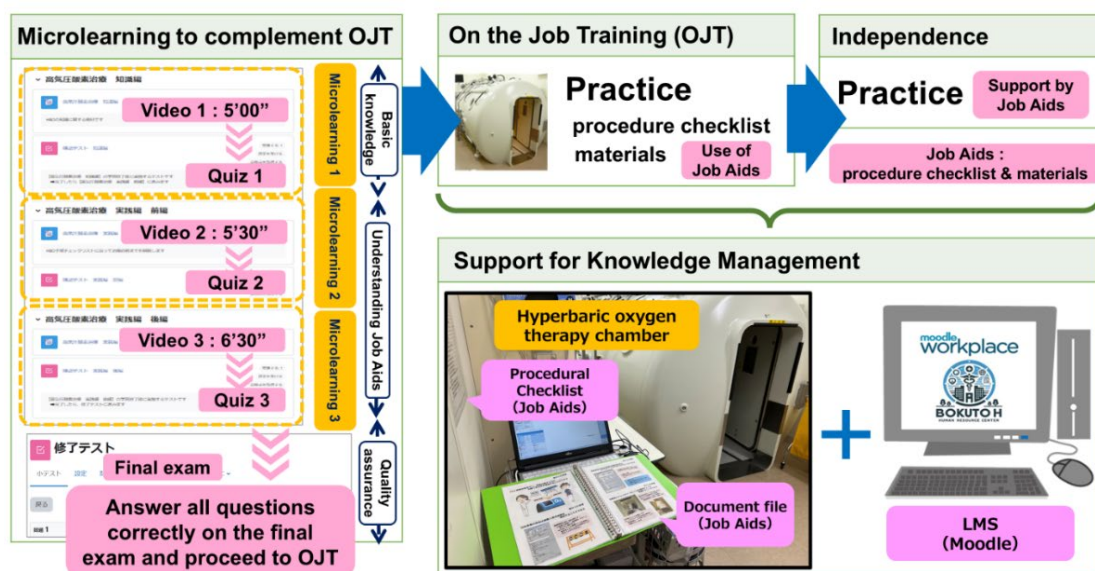


Figure 1. Learning with an LMS and Subsequent Learning Support Framework

2.3 Data Analysis

The log data were organized and classified according to post-training material access, access frequency, and types of materials viewed. Descriptive analyses were conducted.

3. Results

Among the 20 participants, eight continued to access LMS materials after training completion, typically around one month after course completion.

The accessed resources included procedural checklists, learning materials, microlearning modules, and confirmation tests, with variations in access patterns and frequency across individuals.

The remaining twelve participants did not use the LMS after training completion, as clinical tasks could be performed using paper-based materials.

4. Discussion

The results indicate that some nurses continued to use the LMS as a knowledge support tool after training completion. Access to procedural checklists and microlearning modules

suggests practical learning behaviors for confirming procedures and reinforcing knowledge in clinical practice. From a knowledge management perspective, the LMS functioned as an organizational memory and performance support tool beyond its role as a training platform.

This behavior can also be interpreted from the perspective of self-regulated learning, in which learners actively select and revisit resources based on their needs (Zimmerman, 2002). The short-term nature of this use likely reflects knowledge consolidation during the transition to independent practice.

The absence of LMS use among the remaining twelve participants does not necessarily indicate a lack of learning engagement, as clinical tasks could be performed using paper-based materials available in the workplace.

These findings suggest that environments combining paper-based and digital resources allow flexible and context-dependent use of learning materials, supporting knowledge utilization in clinical practice.

5. Conclusion

This study demonstrates that LMS-based training can function as a knowledge infrastructure supporting organizational memory and performance support in clinical practice even after course completion for some nurses. Procedural checklists and microlearning materials, in particular, may serve as important learning resources that facilitate confirmation and knowledge reinforcement in practice.

However, this follow-up study was limited to learning log analysis and did not sufficiently capture the motivations or intentions behind resource reuse. Future studies should incorporate qualitative methods, such as interviews, to analyze learners' perceptions and utilization strategies in greater depth. Such approaches are expected to contribute to the development of more effective and sustainable learning environments that continuously support both training and clinical practice.

Acknowledgements

We would like to thank the Tokyo Metropolitan Bokuto Hospital Emergency Medical Center and nurses for their cooperation in this research.

References

- Ngulube, P., & Ncube, M. M. (2025). Leveraging learning analytics to improve the user experience of learning management systems in higher education institutions. *Information*, 16(5), 419. <https://doi.org/10.3390/info16050419>
- Nishino, A., Kawagoe, A., Kita, T., & Toda, M. (2025). Training design using blended learning and evaluation for emergency center nurses. In *Proceedings of the 1st International Conference on Learning Evidence and Analytics (ICLEA 2025)*. Asia-Pacific Society for Computers in Education (APSCE). <https://library.apsce.net/index.php/ICLEA/article/view/5472>
- Pan, Z., Biegley, L., Taylor, A., & Zheng, H. (2024). A systematic review of learning analytics–incorporated instructional interventions on learning management systems. *Journal of Learning Analytics*, 11, 52–72. <https://doi.org/10.18608/jla.2024.7896>
- Romero-Ochoa, M.-A., Romero-González, J.-A., Perez-Soltero, A., Terven, J., García-Ramírez, T., Córdova-Esparza, D.-M., & Espinoza-Zallas, F.-A. (2025). Knowledge management strategies supported by information and communication technologies for the improvement of teaching practice: A systematic review. *Information*, 16(5), 414. <https://doi.org/10.3390/info16050414>
- Saqr, M., Fors, U., & Tedre, M. (2018). A literature review of empirical research on learning analytics in medical education. *European Journal of Medical Education Technologies*, 1(3), em1804. <https://doi.org/10.1186/s12909-018-1190>
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, 41(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2