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Training design using blended learning and its evaluation for emergency center nurses

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: In order for nurses to perform their duties in their departments, they need to adapt to the methods and culture of the department, as well as to have medical and nursing knowledge and skills. Nursing work in the emergency center requires a high level of expertise and involves handling a large amount of medical equipment. The specific procedures for performing tasks are highly individual to each department, so materials and teaching materials must be produced in-house and training must be conducted within the department. In order to allow learners to learn efficiently and independently, the training was reviewed and changed to blended learning. E-learning content was created mainly for medical knowledge and departmental rules. Blended learning was implemented on Moodle as an LMS and operation began. After the system went live, we analyzed learners' learning methods using Moodle logs and surveys. The results suggest that the training design may be useful for training nurses in the field, and we report the findings here.

Keywords: Nursing education, Emergency Center, Blended learning, Moodle logs, microlearning

1. Introduction

In order for nurses to perform their duties in their departments, they need to adapt not only to medical knowledge and skills, but also to the methods and culture of the organization. Asaka (2016) stated that training nurses was not simply about acquiring technical proficiency, but that an important issue was developing competent human resources who could carry out the organization's mission. Nursing in emergency centers requires a high level of expertise and must deal with a wide variety of patients and illnesses. Furthermore, the specific procedures for performing work are individual to each department, and training materials must be developed in-house and conducted in each department.

Abbasalizadeh (2023) conducted a randomized controlled trial to evaluate the effectiveness of training to improve resilience among nurses working in intensive care units, and reported that the group that used microlearning showed superior effects after the intervention. In this research, in order to support active learning, a training course that had previously been conducted face-to-face was redesigned as blended learning. Since no literature was found that clearly defined microlearning, we defined and used microlearning as "learning that uses complete, structured learning content of approximately 5 to 10 minutes." The development focused on hyperbaric oxygen therapy, one of the training items within the emergency center department of Tokyo Metropolitan Bokutoh Hospital. The training consists of lectures on medical knowledge and job orientation, practical on-the-job training (OJT), and independence.

2. Methods

2.1 Re-design of training

To practice nursing duties, nurses must acquire medical knowledge, understand the rules of their department, undergo bedside training with a supervisor, and then ultimately become independent. Analyzing this training using Gagne's Types of Learning, medical knowledge and understanding of rules are "Verbal Information" and practice, including training, is "Intellectual Skills" (Suzuki et al., 2016). In previous training, all of this was done through face-to-face learning, but learning "Verbal Information" does not necessarily have to be face-to-face. Designing e-learning to enable self-learning will encourage learners to be more active in their learning. In addition, by using the e-learning test function, immediate feedback and a clear exit path can be set. Moreover, unsupervised learning reduces personnel costs.

"Job aids" is a work support tool and a cheat sheet that can be referenced when performing work (Suzuki et al., 2016). Suzuki (2015) stated that he would like to recommend an approach that gradually eliminates the need for "job aids" while using them for work. In this research, we developed a "procedure checklist" as a "job aids," and also created materials to deepen understanding of the procedure as a "job aids."

2.2 Development of e-learning content for microlearning in Moodle

We developed e-learning content for the study of "Verbal Information." The learning content was divided into three parts and video content of about five minutes each was created so that nurses could work on it in spare time between their busy work schedules. In addition, short quizzes were set after each piece of content, and a final exam was set upon completion of all learning. The videos were created using Microsoft PowerPoint slideshows with audio. Even in situations where the Internet is not available, the slides can be filed and used as reference material during work.

Figure 1 shows an overview of blended learning implemented in Moodle. The figures are screenshots of Moodle, so the language in them is Japanese.

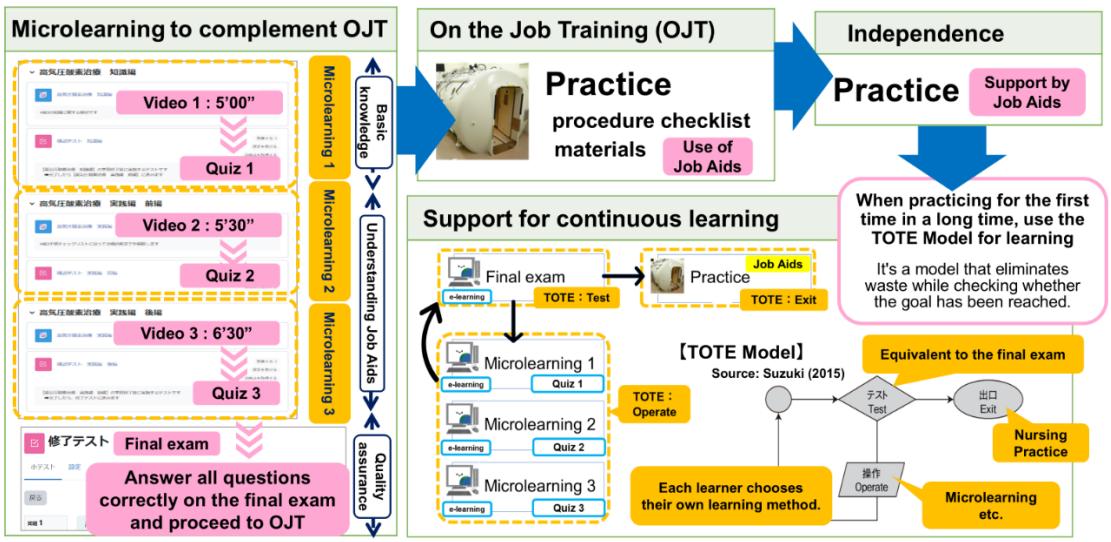

Figure 1. Blended learning overview for effective, efficient and engaging learning

3. Results

We asked nurses working in the emergency center at the Hospital to review their training. 13 nurses responded to the review. After obtaining their consent to use the interview results in this research, we conducted semi-structured interviews following the interview guide. There were 3 learners in face-to-face learning and 10 learners in blended learning. None of the nurses had previous nursing experience related to hyperbaric oxygen therapy.

3.1 Face-to-face learning vs. Blended learning

For efficient learning evaluation, we investigated the number of days it took to complete the "Verbal information" acquisition course and the amount of time spent studying.

3.1.1 Number of days to complete learning "Verbal information"

For face-to-face learners, we surveyed the number of days it took from when they received their training information until they were ready for OJT, based on the learning manager's records. For blended learners, the number of days was calculated by looking up the records of when the learning manager notified them of the training information and the date they passed the final exam from their Moodle logs. Figure 2 shows the number of days it took learners to complete the " Verbal information" study after receiving notification that they could begin studying. In the graph, learners a-c participated in face-to-face learning, while learners d-m participated in e-learning.

In face-to-face learning, there were two students who took more than 60 days from the time they were notified to start learning to the time they actually began learning. In both cases, there was not enough time to complete the tasks, and both the learners and instructors were working overtime. There was one face-to-face learner whose schedule coincided with that of the instructor, allowing him to receive the study guide and lessons on the same day. However, it took about two weeks for the paper tests to be returned. In e-learning, more than half of the learners completed the course in around 7 days from learning guidance to passing the final exam. The two who took 14 days to begin e-learning did not feel the need to start early because they did not have a set start date for their work. Therefore, both said, "If necessary, we could have started right away." One learner who took 23 days to start e-learning was unable to log in due to a system problem. Additionally, learners e, g, and j repeated the microlearning over several days until the final exam.

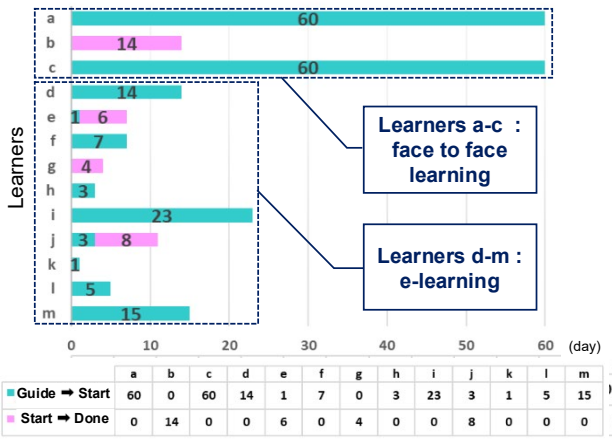

Figure 2. Number of days to complete learning

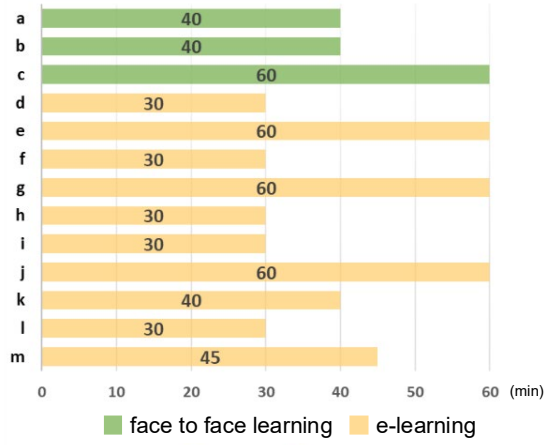

Figure 3. Time required for learning

3.1.2 Time required for learning

We asked the learners to recall the learning situations and were able to get a rough idea of the time it took them to complete the learning process based on their work records and Moodle logs. Figure 3 shows that there was no significant difference in the learning time between face-to-face learning and e-learning. Regarding learning time, in face-to-face learning, the instructor is lecturing and the learner is passive. On the other hand, in e-learning, the learner is actively learning. The learner who took 60 minutes repeated the learning, so each learning session was not very long.

3.2 Learning analysis of blended learning

We asked 10 blended learners about the location and device they used, using Moodle logs and shift schedules. Figures 4 and 5 show that learners are not limited to the workplace, but are using a variety of devices to study. In addition to using IT devices, there were cases where learners printed out paper materials and kept them at hand while learning.
We also looked at Moodle logs to see how much time was spent between each section and looked for learner who split their studies. It was estimated that 7 learners studied in one go for around 30 minutes. Figure 6 shows the cases of two learners who studied while at night shift. In case A, learning was carried out all at once. In Case B, the learner was able to complete their learning while responding to nurse calls and working at the bedside.
However, 8 blended learners were away from the workplace. They said, “I want to study at my own pace.” From this, it was inferred that nurses with little experience in emergency centers feel anxious about leaving the bedside even for just five minutes.

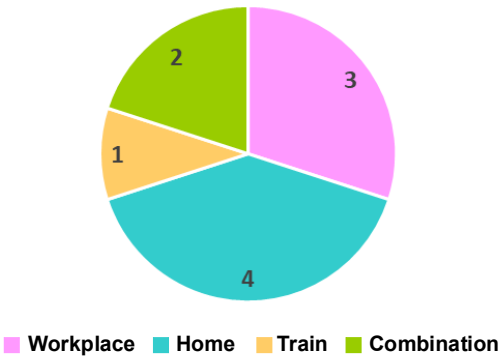

Figure 4. Location

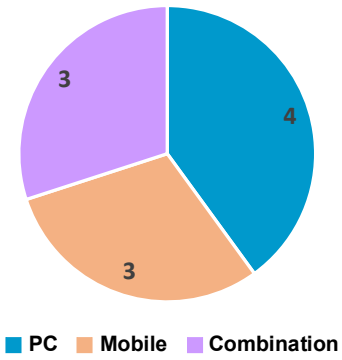

Figure 5. Device

Case A

Learning log Checkpoints	Moodle logs (Japan time)	Duration (min)
Start of Microlearning 1	3:28 AM	
Passed the Quiz 1	3:35 AM	7
Start of Microlearning 2	3:36 AM	1
Passed the Quiz 2	3:42 AM	6
Start of Microlearning 3	3:43 AM	1
Passed the Quiz 3	3:51 AM	8
Passed the Final exam	3:53 AM	2

The perceived time spent learning : 30min

Case B

Learning log Checkpoints	Moodle logs (Japan time)	Duration (min)
Start of Microlearning 1	1:09 AM	
Passed the Quiz 1	2:40 AM	91
Start of Microlearning 2	2:40 AM	0
Passed the Quiz 2	3:11 AM	31
Start of Microlearning 3	3:14 AM	3
Passed the Quiz 3	3:26 AM	12
Passed the Final exam	3:31 AM	5

The perceived time spent learning : 30min

includes time spent responding to nurse calls and working at the bedside

Figure 6. The case of two learners' learning patterns

4. Discussion

Reviews by learners showed that blended learning took fewer days to complete than face-to-face learning. Blended learners said that the positive aspects of blended learning were "I can

do it in my own time and complete it by myself" and "I can learn by myself." It is assumed that being able to implement the program without having to wait for an instructor led to a shortened learning period. In addition, by making the videos short, we received feedback such as "They're compact and easy to get started with," "It's good that they're not too long," and "I can watch them over and over again," making it an active learning experience. Furthermore, when we looked at the devices used, the study methods, and the time spent studying, we found that students chose the place and time that suited them best. For these reasons, we believe that blended learning was a suitable method for departments where it was difficult to proceed with learning in a planned manner.

The intention to have learning carried out within the workplace was not always realised. However, there were also cases where people were able to complete their learning by splitting it into segments using microlearning during gaps in their work schedules. In this case, the student was able to pass the final exam in the same amount of time by studying in parts as by studying all at once. It may take a little more time for learners to be able to study during their free time at work, because they are not accustomed to LMS. Learners should not be forced to take training outside of working hours, but this could be an option for active learning. Being able to choose the time and place for learning and being able to progress with learning without waiting makes learning effective, efficient and engaging, and we believe this leads to learner autonomy.

The background to this research is that the learners were unfamiliar with Moodle. If learners become accustomed to blended learning and how to use Moodle, and this culture is cultivated throughout the workplace, it is possible that more learners will consider e-learning as an option during their free time at work. In a work environment where Moodle was being used seriously for the first time, we received many positive opinions and the fact that it led to proactive learning by the learners gives us hope that it will be used in the future.

5. Conclusion

It was suggested that the conversion of " Verbal information" to e-learning and the use of “job aids” could be useful in solving issues in workplace learning and nurse training. It was found that supporting learners in active learning is key to accelerating learning.

This time, we were limited to developing one training session. In the future, we believe that by applying this to other items and implementing it in the LMS, we will be able to build a nurse training system that enables learners to learn more actively.

Acknowledgements

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