Research on Methods of Human Resource Development Related to Improving Safety Abilities

Issues on education to improve safety abilities of the workplace include the difficulty of practicing and entrenching at workplaces what is taught in group courses and the educational effects being less than expected at learning opportunities such as workplace safety activities and job training. This research focused on, from a perspective of corporate human resource development, an effective structure of group training as teaching and entrenching methods that heighten workplace safety activities. It also focused on modifications to the pre- and post-training approach for enhancing training effects. As we have verified the educational effects of a training model designed and implemented under the aforementioned viewpoint, we will report our findings in this article.

1 Introduction

A variety of group training for improving safety abilities of the worksite has been set up at JR East, and trainees are expected to implement and entrench practical approaches at their workplaces. However, being busy with day-to-day jobs and having insufficient cooperation from people around them often cause difficulties in practicing the lessons. In addition to group training, employees also have many learning opportunities through day-to-day jobs such as training, meetings and human relationships in the company. But we face the issue that those opportunities are not exploited due to insufficient knowledge, know-how and methodologies to enhance the effect of such education.

As the Safety Research Laboratory was aware of the problem that the 4M4E analysis method, a method of improving safety abilities of the worksite, has not sufficiently caught on at worksites, we proposed an ideal model of entrenching and disseminating the method of improving safety abilities of the worksite (“the ideal model”) in previous research.

In this research, we designed and implemented a training model based on the above-mentioned ideal model, aiming to find out conditions for entrenching and disseminating group training results in workplaces and for personal development in day-to-day work. Here we will (1) briefly review the development process of the ideal model, (2) introduce the application and implementation of the ideal model to the training model in this research and (3) report the findings from verification by interviewing trainees.

2 Ideal Model for Entrenching and Disseminating Methods of Improving Safety Abilities of the Workplace

Previous research (1) examined literature on generally assumed “learning” from perspectives such as those of education, (2) picked up causes of why it is difficult for group training results to become entrenched in workplaces and (3) studied and proposed the ideal model based on the results of (1) and (2).

2.1 Literature Survey

We carried out a survey of literature on generally assumed “learning” from an educational perspective as well as perspectives of human resource development, management study and organizational behavior. Nakahara et al. (1) and Mima et al. (2) placed importance on the fact that people have many chances to learn in their daily lives in addition to group education and training at schools and businesses. They argued that such day-to-day learning opportunities contribute to understanding and entrenchment of lessons. Thus, we can say it is important to design day-to-day opportunities to repeatedly practice what was learned at the worksite after group training and to integrate at workplaces opportunities (need) for personal improvement on what was learned.

Now we introduce two points from the literature on designing group training and the like which may be of particular importance in conducting this research.

(1) Instructional design

As Nakahara et al. (1) defined, “instructional design” as the methodology to effectively and efficiently design and conduct training, and its procedure is illustrated as the so-called ADDIE model, a five-phase process of Analysis, Design, Development, Implementation and Evaluation (Fig. 1). More specifically, in the analysis process, the training needs (training purpose, issues of trainees and the organization, required knowledge etc.) are identified. In the design process, training materials and other details are designed based on the analysis results. And in the development process, actual training materials to be developed are produced based on that design. After training is implemented, it is evaluated on its overall framework and on whether the expected training results are achieved so as to lead to future improvements.

(2) Learning environmental design

“Learning environmental design” is the concept and method of designing and supporting workplace learning environments such as on-the-job training. In this idea, trainee participation in activities at workplace and classroom is considered to be learning. Nakahara et al. (1) points out that training and workplace human resource development are separated at many companies, and that they tend to focus only on instructional design such as group training and education material development as specific training methods, while they focus on human resource development through on-the-job training.

It is further suggested that combining instructional design and education environmental design is important to entrench and
disseminate the group training results in the workplace. In other words, the key is to develop good group training by instructional design and to design a job structure and an organizational system and space that allow group training results to be practiced at the workplace by learning environmental design.

Taking these points into account, we have designed the ideal model to entrench and disseminate what is taught in group training.

2.2 Identification of Problems in Entrenching and Disseminating Lessons Learned

Next, we reviewed the current problem that it is difficult for lessons of group training to be entrenched and disseminated in workplaces, using the 4M4E analysis method as an example. We picked out problems (Table 1), focusing on five factors concerning group training and workplaces ((1) instructor, (2) trainee: “introducer” who plays the role of practicing the lessons back at the workplace and instructing other employees so the lesson becomes entrenched, (3) skill: lesson to be entrenched at workplace, materials used in training and at the workplace, (4) environment: status of entrenchment at the workplace, and (5) management: supporters, rules, structure).

These problems were organized in comparison with the literature research results and consolidated into the following four viewpoints as the foundation of the ideal model.

(1) Easy-to-understand teaching
Problems such as training course management, material development and instructor’s training, taking instructional design into account

(2) Person promoting practice and entrenchment at the workplace of lessons learned
Problems such as cultivating a sense of commitment and motivation of trainees and obtaining knowledge required for performing a role

(3) Support and advice to introducer
Problems such as presence of managers and senior workers who understand the importance of supporting trainees, support and advice to introducers

(4) Further efforts in what is taught and improvement of the introducer
Problems such as how to make what is taught be continuously practiced and improved at workplace even without being particularly aware of it

2.3 Deriving the Ideal Model

Focusing on the literature research and the current problem that it is difficult for group training results to become entrenched and disseminated at the worksite, we studied the factors leading to methods of improving safety abilities being practiced and entrenched. In this study, we took into account the points of learning described in 2.1 (integration of instructional design and educational environment design), and picked out the requirements that show the direction of the solution based on the four viewpoints (problems) picked out and consolidated in 2.2 (Fig. 2). Taking those requirements as the ideal model that is effective for entrenching and disseminating the methods for improving safety abilities of the worksite, we decided to design, conduct and verify actual training.
(3) Training concepts and curriculum
In training, trainees must be informed of the purpose and contents of the training in an easy-to-understand manner. So, in this training model, we informed the managers (trainees) and their supervisors in advance of the three viewpoints the trainees who will bear the role of promoting safety activities at the workplace were expected to learn, as the training concepts.

- *Mamoru* (to protect): Reconfirming the importance of safety activities in line with the principle of respect for human life by experiencing tragedy through a simulated accident.
- *Tsukuru* (to create): Recognizing that coordination at workplace is essential for safety efforts to be practiced and entrenched.
- *Idoma* (to challenge): Scientifically attempting to achieve safety. Learning the mechanism by which human errors occur and reconfirming effectiveness of drawing lessons from issues at other workplaces.

(4) Encouraging entrenching and disseminating what is taught
Usually, even a motivated trainee will face difficulties in overcoming workplace safety issues without the cooperation of others. We thus had superiors take part in pre-training activities, part of that training, workplace practice and review, to make it easier for the trainees to receive support they needed from superiors in the process of entrenching and disseminating what is taught. At the same time, we instructed the trainees on the significance and value of coordinating with superiors, co-workers and subordinates and the methodology of improving such coordination in the “Tsukuru” lecture.

For the items to be practiced (action plan) at workplaces set down in the second day of training, we set an approx. five-month practice period and an opportunity for review. That was to allow trainees to share practice experiences among themselves and to reaffirm that improvement of workplace safety activities is a continuing issue (Fig. 3 (4)).

(5) Improvement of learning opportunities
In the training model, we stressed the interactivity among individual trainees and between and the instructors, shifting the class structure from lecture style to dialog style with an aim of convincing trainees about what they would learn. For example, in the process of developing and sharing targets on the second day of training (fig. 4) and in the process of reviewing the training five months after its end (fig. 3 (4)), we departed from the conventional method where a presenter speaks in front of other trainees and the audience asks questions at the end. Specifically, we formed small groups of five to eight persons including the presenter to allow the audience to give advice to the presenter through increased exchange of information by interactivity, aiming to enable them to reflect on approaches during workplace practice.

Furthermore, focusing on indirect experiential learning where people learn from others, we set up a lecture to learn from the safety efforts of other companies. In the lecture, crew managers simulated the approach to patient safety of emergency services and rolling stock maintenance managers simulated the safety efforts of airline maintenance. They also received a panel discussion course by a facilitator so that they could appropriately apply the approaches to their jobs at JR East.

**Results and Review of the Training Model**

Next, we will consider requirements for entrenching specific approaches at the workplace and for improving the education effect of training, considering lessons learned. That was done based on the results of applying the training model and interviews with trainees.

### 4.1 Requirements to Facilitate Lessons Learned Being Entrenched and Disseminated

At the review after five months, the trainees reported their approaches in the framework of the action plan they made in the training. While there were some changes such as trainees having moved to other workplaces in the practice period, we selected requirements to facilitate lessons learned being entrenched and disseminated from among the workplaces (trainees) where application of the training was performed.

(1) Sharing the purpose and contents of the training
As explained in 2.1 (2), there is a tendency for human resource development in training and at the workplace to be separated. At workplaces where effective approaches were practiced, however, the trainees commonly shared the purpose and contents of the training, and we found a tendency for training and the workplace (day-to-day work) to be more closely positioned. For example, there was a case where a trainee reviewed the process of communicating lessons learned from issues at other workplaces and put that into practice at his workplace. In other cases, a trainee gathered information on unsafe elements from front-line employees and found the direction of a solution in collaboration with the branch office that supported the worksite. In such cases, we were able to gain interesting results that sharing the purpose of the training between the training organizer and the trainee affects not only on the level of understanding and conviction of the need for training, but also the training results being entrenched and disseminated at the workplace.

In the interviews, many trainees pointed out that workplace cooperation did not work well or took longer than expected to start because they could not understand the relationship between pre-training activities and practicing the action plan. This clarified that one of the requirements for what is taught to be entrenched
and disseminated at workplace is that the actual workplace (trainee) is given sufficient information on the framework of the training shown in Fig. 3 and on the goals of learning (image of the goal) in an easy-to-understand manner before the training.

(2) Coordination with other people
Building coordination with others before training is distinctly seen with workplaces (trainees) where effective approaches were practiced. In designing the training model, we tried to encourage superiors to be involved with the training before it starts in order to prevent trainees from being isolated in the process of lessons learned being entrenched and disseminated. At workplaces where application of the training was performed, the trainees had a tendency to enhance coordination with co-workers and subordinates and other sections as well as superiors even before the training. That enabled the action plan to be launched immediately after the training. This means that it is difficult for an action plan made up one-off in the training to be entrenched and disseminated if there is not a system (basis) for accepting it at the workplace. Thus, training designers should be careful in setting up pre-training activities that make trainees aware of the need to create a system (basis) before the training to practice what is taught at the workplace in coordination with other people. This is not just for training on workplace safety; it should be a common requirement for leadership training and other training that requires coordination with superiors, co-workers, subordinates and other sections at workplaces.

(3) Setting up a venue for review
Interviews with trainees in the workplace practice period were intended to verify the training model of this research and also to have trainees review their own status in entraining and disseminating lessons learned. General review methods include a report meeting after a given time, and this is also used in this training model. But with mandatory review by simply setting a venue for reviewing, it is difficult to produce essential educational effects. The results of this research showed a requirement for enhancing the effect of workplace education is the process where trainees take actions on existing problems during the workplace practice period and learn while reviewing (self-reflecting) the results.

4.2 Requirement of learning opportunities that enhance educational effect
In order to entrench and disseminate at workplaces the lessons learned, it is necessary to improve the effect of training itself, such as the level of understanding of the lecture and convincingness of the needs of the training. So, here we dig into the requirement for learning opportunities that can enhance the effect of learning and also be applied to training other than group education.

(1) Effects of dialog
Many trainees pointed out dialog with instructors and other trainees as a requirement for enhancing educational effects. Learning through dialog has an educational effect that it can complement areas that one-way lectures cannot give. It includes being complemented by other people in areas one is without knowledge of and realization there are areas one does not have knowledge in. As introduced in 3.1 (4), we composed small groups of five to eight trainees when developing and sharing practice targets on the second day of the training (Fig. 4) and at the review after five months (Fig. 3 (4)) to give interactivity that increases the amount of information and provide an opportunity for trainees to receive much advice from other trainees. The purpose was to make trainees review their own approaches in the workplace practice period. As a result, the trainees presented comments that suggest the above-mentioned educational effect and remarked that contents of lectures with few chances for dialog are hard to remember, confirming the effectiveness of dialog. We therefore believe it is important to create more chances for dialog in line with the theme of the education when designing training.

(2) Effects of learning from others
The purpose of experiential learning from others is to simulate workplaces where more advanced approaches have become entrenched to find hints to overcome safety issues at trainees’ own workplaces. In the interviews with trainees, such programs are some of the more appreciated training programs in the training model. We can see examples such as improvement of tool management at maintenance worksites where a trainee sought hints for solutions by comparing the safety issues at the workplace with those of the simulation. Another reason the programs are appreciated is the presence of facilitators who facilitated appropriate application of such simulation to jobs at JR East. For example, when a lecturer mentions technical points of other business, the facilitator immediately asks about details and explains in simple terms that are easier for trainees to understand. We thus believe it would be useful to introduce panel discussion type training by a facilitator.

When there is a large difference between the approach at another company and that of the workplaces of the trainees, however, it would be difficult to apply and implement the simulated approach. Thus, in designing such training, the key is to choose companies and the like that have features common with the day-to-day jobs of the trainees and that the trainees can apply to their own workplaces with a little effort.

5 Conclusion
In this research, we designed, conducted and verified a training model that is effective for entrenching and disseminating methods for improving safety abilities of the worksite, and we clarified the requirements for approaches based on lessons learned to become entrenched at the workplace and for enhancing the educational effects of training.

In the future, we will analyze the relation between workplace coordination and accident prevention activities based on the results of a questionnaire survey of workplaces. Through that, we plan to further consider entraining and disseminating lessons learned.

Reference:
2) Noyuri Mima, Yuhei Yamauchi, Mirai no Manabi [in Japanese] (Këtaishi Shobo, 2002)