Trainer Appropriation and Transfer of a New Prevention Approach in Material Handling Based on Action Principles

Denys Denis
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Trainer Appropriation and Transfer of a New Prevention Approach in Material Handling Based on Action Principles

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ACKNOWLEDGEMENTS

SUMMARY

Background and objective: Given the failure of handler training programs that focus solely on the "straight back, bent knees" safe lifting technique, a new approach called "Integrated Prevention Strategy for Manual Handling" (IPSMH) was proposed in 2011. Part of its originality lies in the use of nine movement principles that make it possible to understand and analyze the many techniques handlers use as a matter of course in their jobs. The main objective of the present study was to observe a group of Occupational Health and Safety (OHS) practitioners trained in the IPSMH and evaluate to what extent they appropriate this approach and transfer it during interventions in actual workplaces.

Methodology: The study was made up of four complementary, sequential parts. First, an online questionnaire was developed in order to survey the occupational health and safety (OHS) intervention practices of a group (n=104) of practitioners in Québec (*Part 1*). Next, 28 OHS practitioners were trained in the IPSMH. After the training, several indicators predictive of transfer were evaluated by means of a questionnaire (*Part 2*). A mixed qualitative methodology involving various data-gathering tools was then used to evaluate the subjects' appropriation and transfer of the IPSMH during actual workplace interventions related to manual material handling (n=19) over a two-year period (*Part 3*). Appropriation Indicators and determinants made it possible to evaluate and explain three levels of IPSMH transfer: exemplary, satisfactory or poor. In addition, the use made of the action principles during these interventions was further investigated. On the basis of the results obtained, recommendations were formulated to improve the IPSMH and to train trainers in its correct application (*Part 4*).

Principal results: <u>Part 1</u>: The survey revealed that the work of OHS practitioners in Québec consists largely in the preparation and delivery of information and training sessions. The predominant pedagogical approach is the transmission of knowledge; rarely is the learners' active, contextualized involvement solicited. These practitioners may be considered as OHS training specialists, with more than ten years of experience on average. However, since their job is to offer training on many different topics, they are actually generalists rather than experts in any particular field, such as manual material handling. This information made it possible to adapt the IPSMH training to the reality of OHS practitioners.

<u>Part 2</u>: The predictive indicators evaluated after the training suggest that the training has a high potential for encouraging the transfer of knowledge to the workplace. The trainees perceived the content as useful and said they felt they mastered it well, would be able to apply the skills they had learned, and intended to teach them to workers during future interventions. Their confidence in their personal ability to apply the IPSMH—a strong predictor of transfer—was very high, on average. These results led the research team to check the actual extent of the subjects' transfer of the training content to the workplace.

<u>Part 3</u>: Of the 28 subjects trained, 16 were observed during a training session, some of them on more than one occasion, for a total of 19 cases studied. The interventions took place in various workplaces and involved manual handling tasks that were highly varied in nature and complexity. The trainees benefiting from the interventions were either production workers (n=13) (the IPSMH target group), company employees responsible for training (n=3) (e.g., supervisors) or other (n=3) (e.g., rehabilitation specialists). For 10 of the 13 sessions provided to handlers, the indicators were evaluated in greater detail and showed excellent appropriation by the practitioners in several

respects. However, two cases showed a poor level of appropriation. The greatest differences observed between the IPSMH and the training provided mainly concerned their shorter duration, the rarity of actions to transform work situations and certain aspects of the training structure put in place to stimulate learning. A number of determinants were identified, which greatly explain the differences noted between the IPSMH and the handling training practices in use. The practitioners mainly cited factors related to their own job conditions (e.g., excessive work load) or to the client organization's situation (budget constraints, etc.) that forced them to adapt the IPSMH to fit the context. The research team was able to identify individual factors, some linked to individual subjects, as well as factors related to the nature of the handling tasks, and to the workers being trained (also mentioned by some of the practitioners). The practitioners applied the action principles as they were taught to do, although some principles tended to be emphasized while others were underused (a fairly strong "postural bias" was noted). Finally, rather than incorporating the proposed changes into the results, the discussion was highlighted here and there in insets describing recommendations for improvements to the IPSMH approach and training (part 4).

Discussion: The results suggest an "emergent" form of appropriation. On the one hand, the practitioners showed a strong ability to appropriate and transfer the training content: their use of the action principles and other concepts was very much in line with the IPSMH, although a few lapses were noted. They made obvious efforts to contextualize the training content, to choose suitable pedagogical tools and to apply strategies for eliciting exchanges among participants in order to create a good dynamic. On the other hand, they are faced with a contradiction between two teaching paradigms: one emphasizing the transmission of theoretical knowledge, the other emphasizing the learners' active involvement in constructing their own knowledge. Practitioners must therefore make difficult transitions, along with the corresponding compromises: ***a.*** from a role as "expert trainer" to a new role as mediator of learning, which touches on their professional identity; ***b.*** from strict control over content and delivery, to a certain tolerance for uncertainty while taking into account the normative requirements of training; ***c.*** from knowledge-based content to content focusing on motor skills related to job requirements and training topics; ***d.*** between the needs of the "requesting client" and those of the "target client" in terms of the training mandate and objectives. These transitions can be destabilizing and can hinder the application of the IPSMH if the practitioners do not feel guided and supported.

Key points:

- Despite the complexity of the IPSMH and the obvious paradigm rupture it involves, most of the OHS practitioners trained in the approach were able to appropriate and transfer it to their day-to-day workplace interventions. The IPSMH is appreciated by all stakeholders.

- There are still divergences between certain IPSMH concepts and conventional practice, some of which are attributable to obstacles that the practitioners try to work around. Such adjustments are unavoidable, for the time being.

- Practitioners trained in the IPSMH are transitioning from their old training practices to the new pedagogical requirements of the IPSMH; the resulting contradictions can be destabilizing and even discouraging if practitioners are not well supported.

Note to readers:

This project is the second phase of a research program comprising three main phases.[1] The first phase of this programming consisted in developing a new approach to handling interventions. A research report, published in 2011 (R-690 in French; R-784 in English), presents this approach, called the Integrated Prevention Strategy for Manual Handling (IPSMH). This approach is detailed, as are its underlying theoretical foundations. In this case, the action principles, which are a large part of the IPSMH's originality, are described in this report with detailed fact sheets, one for each principle. The reader should keep in mind that the IPSMH constitutes a "training intervention," i.e., it combines a training activity with an intervention to modify the most restrictive working conditions.

The project covered by this report constitutes the second phase of programming, which consists of training practitioners in the use of IPSMH and verifying how well they are able to appropriate and transfer the information in actual intervention contexts. The idea is to verify if the IPSMH, which constitutes a break with the traditional approach to prevention in handling, can be realistically used by safety practitioners in their mandates to prevent handling accidents and injuries.

A final phase to come, which will complete the programming, will consist in evaluating the impacts of IPSMH in terms of preventing musculoskeletal disorders (MSDs).

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[1] The program is made up of several biomechanical studies, most of which have the objective of supporting the three central phases, which constitute the backbone of the program.

No one can claim to promote learning and create the conditions necessary for it if they do not seek to develop, construct and clarify their own personal conception of learning.

[Translation] taken from *Les théories de l'apprentissage*

Conceptual diagram summarizing this four-part research project
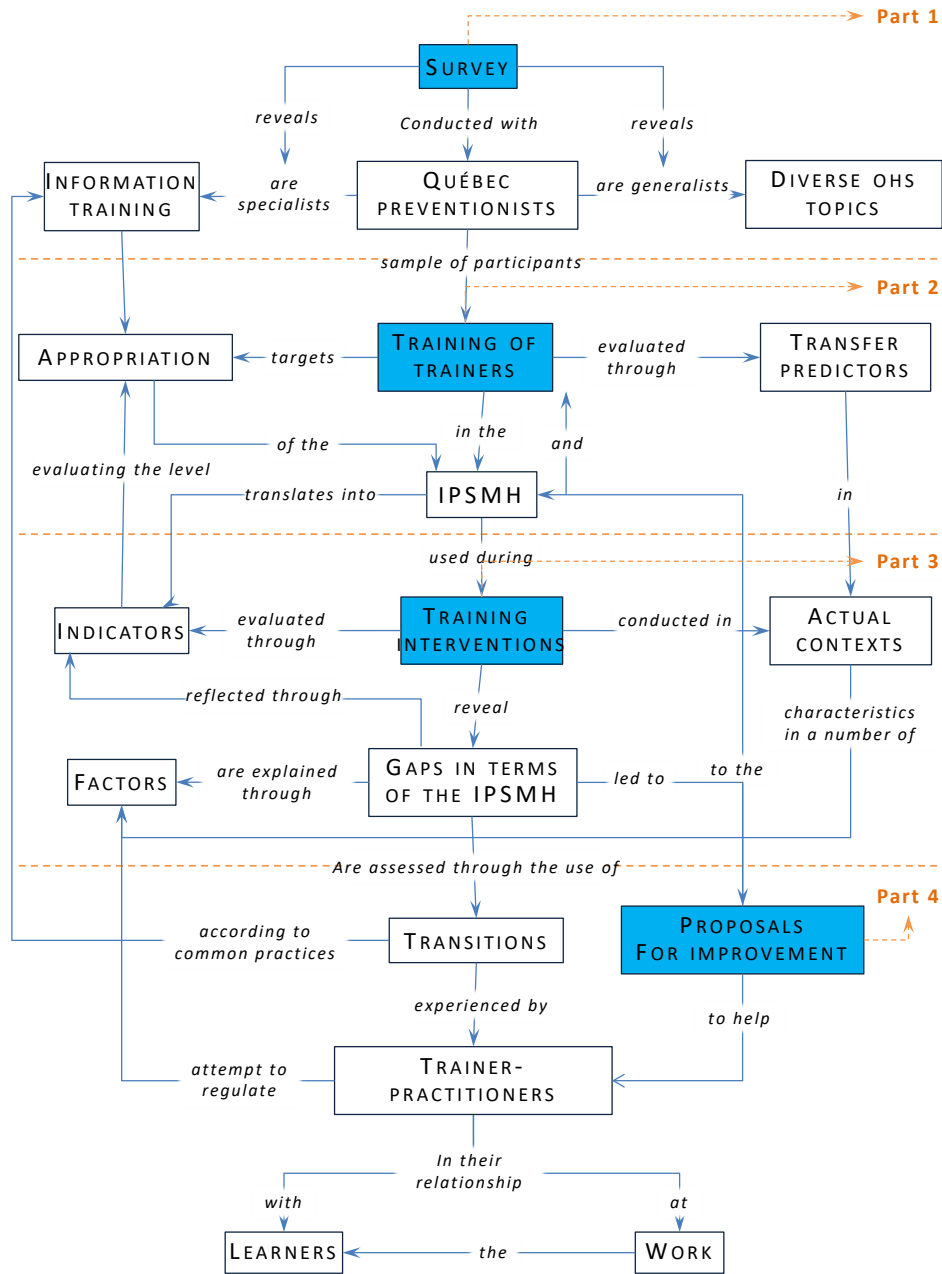
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LIST OF ACRONYMS AND ABBREVIATIONS

CNESST: Commission des normes, de l'équité, de la santé et de la sécurité du travail

EQCOTESST: Enquête québécoise sur des conditions de travail, d'emploi et de santé et de sécurité du travail/Québec Survey on Working and Employment Conditions and Ooccupational Health and Safety

HSC: Health and Safety Committee

IPSMH: Integrated Prevention Strategy for Manual Handling

JSA: Joint sector-based association

MSD: Musculoskeletal disorder

OHS: Occupational health and safety

TP: Trainer-practitioner

1. INTRODUCTION

1.1   The Issue of Handling-related Musculoskeletal Disorders

In Québec, 2,244,000 workers, or almost 63% of workers surveyed by the EQCOTESST (Stock et al., 2011), reported experiencing musculoskeletal pain that troubled them during their activities: approximately three quarters of them (72.3%) felt that the pain was related to their jobs. According to this survey, handling is one of the primary causes of musculoskeletal disorders (MSD) with prevalence among manual handlers[2] of around 55%. Young people (15 to 24 years old) are particularly vulnerable, with handling being the leading cause of accidents in that age group (Ledoux and Laberge, 2006). The data show that over a four-year period (2003 to 2006), more than $100 million per year were spent to compensate workers who had sustained accidents related to handling (Allaire and Ricard, 2007). The occupations of nursing assistant (2290 cases) and handler (1827 cases) are those most associated with back pain.

Many literature reviews (Ayoub et al., 1997; Bernard, 1997; Burdorf and Sorock, 1997; National Research Council, 2001; Vingard and Nachemson, 2000) and other studies (Gardner et al., 1999; Hoogendoorn et al., 2000; Liira et al., 1996; Yeung et al., 2002) note a positive and significant relationship (from moderate to high) between handling and back injuries. Frequent flexion and twisting of the torso, as well as lifting heavy objects, appear to increase the risk of back injury. The causes and mechanisms of injuries are not clearly identified, but according to the National Research Council (2001), there seems to be a direct relationship between back injuries and the mechanical load imposed during handling work.

1.2   Prevention Efforts Have Mixed Effects

There is consensus on the importance of preventing the risks associated with handling at their source (Rodrick and Karwowski, 2006). While the targets have been clearly identified (AFMA, 2009; ASCC, 2007), the challenges are more about what should be done to transform them, given the possibilities for action available in the workplaces (Denis et al., 2011a). However, with respect to handling training, the situation is not as clear-cut. Although it is the most requested avenue of prevention by employers (Rivard and Lauzier, 2013) and, consequently, is at the core of the prevention practices of many OHS stakeholders and organizations, the success of handling training remains mixed (Kroemer, 1992; Wood, 1987).

The relevance of training programs focused on the use of safe techniques has been questioned in several meta-analyses (for a summary, see Denis et al., 2019). For instance, workers use methods other than those recommended, even after receiving training (Harber et al., 1988; St-Vincent et al., 1989). A growing gap can be observed between the provision of training and the knowledge resulting from several field studies conducted in various handling contexts, which show that experienced handlers use methods that differ from traditional safety recommendations (e.g., Denis et al., 2011b; Denis et al., 2007; Couture and Lortie, 1999; Baril-Gingras and Lortie, 1995; Govaere and Schouller, 2006).

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[2] In Québec, 35,460 people work as manual handlers, of whom 90% are men and 10% are women (Statistics Canada, 2011).

1.3   Proposal for a New Approach to Accident and Injury Prevention: the IPSMH

Based on these findings, a new integrated prevention strategy for manual handling (IPSMH) was developed (Denis et al., 2011a). It is intended to be a comprehensive, operational and useful approach for practitioners to support their prevention activities. The IPSMH uses training as the starting-off point in establishments to take action more broadly in handling contexts, in order to influence working methods, of course, but also to improve facilities, equipment, work organization methods, etc., in parallel, to reduce constraints. Similarly, it makes it possible to work with apprentice handlers on more individual aspects, such as their perceptions or their understanding of their actions and their impact on their health. In accordance with the perspective of Rossi et al. (1998), reinterpreted by Durand et al. (2007), the theoretical model of the program[3] will be presented. The prevention approach developed is unconventional: it rests on the concept of pedagogical mediation (Rézeau, 2002), which is the assistance or the support that an individual (a trainer-practitioner (TP)) can offer (apprentice) handlers in order to facilitate the integration of knowledge useful to the exercise of their work. Concretely, it means a dialogue between the TP and the group of workers to get them to take a critical look at the way they interact with others and their work environment. The idea is not so much to impose ways of doing things on trainees but to build on what is already being done in the workplace and to collectively discuss the value of doing so.

Based on the research team's practical experiences, this approach has the advantage of reducing the resistance to change observed in most handlers in training, for whom the traditionally taught techniques, such as "straight back bent knees," are difficult to apply or are even inappropriate in many contexts. By not trying to impose these techniques and instead letting them use their usual methods, handlers feel that their expertise is being taken into account and valued. The process thus helps them to reflect and to question themselves, and not to simply be the "executors" of a standardized technique. The TP can encourage them to explain why they use a particular technique in a given context by challenging, raising doubts, provoking debates and fostering discussion, etc. By interacting with the group, the TP stimulates workers' experiences and judgment to help them become more autonomous as they learn the job of handler. One of the claims of this approach is the belief that this way of thinking about practice may make it easier for individuals to reinvest their know-how in other relevant situations (referring to the principal of generalization of the learning acquired during training), because they will better understand what motivates and guides their ways of doing things. Finally, confronting the viewpoints of handlers can have an effect on the dominant culture of the group. In fact, it is not uncommon to observe the participants in these environments testing their limits, forcing themselves, and/or to see new trainees taking risks to impress their peers (Vatin, 2001).

Action mechanism A: concerning the intervention strategy based on <u>pedagogical mediation</u> and <u>workers' participation</u>

Pedagogical mediation, by considering the fundamental needs of individuals, reduces resistance to change and increases the receptivity of handlers in training, ensuring better retention and application of concepts.

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[3] Corresponds to the logic of the program, i.e., the mechanisms by which it is supposed to produce the expected outcomes if implemented as intended (Durand et al., 2007: p. 6). Here, and although intermediate effects can be identified, the "expected effects" of IPSMH are ultimately to prevent the occurrence of handling-related MSDs.

The work situation is analyzed and linked to the handlers' ways of doing things in order to identify the sources of constraints or, to the contrary, resources that the handlers can use. Ideally, this dialogue between the practitioners and the workers will take place directly at the latter's workstations or in workshops that simulate them (with reference to the principle of identical environments), and not in a neutral location such as a classroom.

Action mechanism B: concerning the logic of training based on <u>workers' interaction with their work context</u>

Individuals and their ways of doing things are not at the core of learning; rather, it is the interaction between these individuals and their environments (dynamic system) and how they adapt. Trainees learn to solve the problems (primarily motor) posed by their variable and often restrictive environments: the approach is therefore based on skills development.

This proximity to real work contexts also makes it possible to identify what is impeding the use of know-how in the work situation. For example, facilities may be deficient, equipment poorly adapted or containers problematic. With training as an entry point, one can also influence the work conditions: the scale of such actions is thus broader than simply acquiring know-how. This approach also recognizes the importance of preventing the source of risks associated with handling in order to eliminate or reduce them.

Action mechanism C: concerning the "<u>integrated</u>" prevention strategy

Acting simultaneously on the critical dimensions of the handling work situation, i.e., on working conditions, first makes it possible to gradually increase handlers' leeway to do their jobs, and consequently, to prevent the MSDs associated with this type of work. The handlers don't feel that the entire burden of prevention rests on their shoulders alone, but that their working conditions are also being considered: they are not only seeking to adapt, but can also act proactively on their environment.

1.4   The Challenges of IPSMH Appropriation and Transfer

Presenting this theoretical model allows the reader to grasp the complexity of the IPSMH and the transferral difficulties it may raise for users: although it has its merits, the approach is unconventional and it poses challenges in terms of appropriation. On the one hand, it may take more time than traditional training courses, which usually take place in half a day. Organizations are sensitive to this time dimension, which means that TPs must develop arguments that will enable them convince workplaces to fully invest in this new approach and to allocate the budgets necessary to cover the direct and indirect costs associated with applying it fully.

On the other hand, the TP's role is very different than that of a traditional trainer, which most often consists in transmitting knowledge to handlers who listen passively, without necessarily being actively involved. In order to support TPs in this new role and to enable them to comment on the many ways of doing things that handlers can show them or tell them about, various tools have been developed for TPs, who must learn and master them. Principles of action and work organization have also been developed (for a complete description of principles, see Denis et al., 2013). They represent the basic material that TPs require in order to be capable of assessing the relevance of the handlers' know-how. The principles make it possible for TPs to provide relevant feedback to handlers on the techniques they use in their own environments. They have the advantage of not being limited to postural aspects and of covering all of the key elements involved in handling loads (e.g., body balance, rhythm of movement, use of the body, taking advantage of load characteristics). In addition, they can be transposed to many handling contexts and tasks.

This brief overview of the new training program shows how much TPs, thanks to their handling expertise, become central players in the learning process. Thus, the training duration to be negotiated, the openness of the client organizations and their commitment to modifying problematic work situations, the workers' motivation to participate, the complexity of the handling activity in question, and the conditions in which it takes place are all sub-variables with which the practitioner must juggle to adapt and communicate the training content. Furthermore, for most stakeholders who work in the area of handling, the concepts contained in the proposed new program and how they are conveyed to handlers are quite new. Most OHS practitioners are not handling specialists: they are called upon to deal with a wide range of vocational activities and occupational health issues. Given that context, it seems obvious that they must be trained in this new approach and its tools so that they can comfortably and appropriately apply it in the handlers' own workplaces. Pedagogical support is necessary to ensure that they follow the philosophy of this new training approach. The issues of appropriation by TPs and the transfer of their learning in real situations are therefore essential to achieve the optimal implementation/use of the IPSMH. In the following section, the key factors that influence transfer of training (i.e., use of what has been learned in training in an actual context) will be reviewed. The theoretical model of Baldwin and Ford's (1988) training transfer process will serve as the reference framework.

2. STATE OF KNOWLEDGE

2.1   What Is Meant by Transfer of Training

Transfer of training can be described as "the application in the workplace of the knowledge and skills acquired through a training program, by ensuring that the knowledge and skills learned are maintained over time" [free translation from *La gestion de la formation et du développement des ressources humaine : Pour préserver et accroître le capital compétence de l'organisation*, 2nd edition, P. Rivard and M. Lauzier, 2013, p. 240]. As can be seen from this definition, transfer of training is seen as a dynamic process,[4] one that takes place over time, in which a number of variables may play a role. We will first discuss how this transfer poses difficulties for learners.

2.2   The Challenges Posed by the Transfer of Training

Training is one of the most important means of ensuring the attainment, maintenance and refreshing of workers' skills (Rivard and Lauzier, 2013). In fact, US businesses invest more than $126 billion annually in training (Paradise, 2007). In Canada, companies invest an average of $787 per employee on training every year (Howard and Hughes, 2009). Given the scale of amounts allocated for training, it is normal for organizations to be concerned about the cost-effectiveness of their investments. However, studies show that only a small proportion of the concepts and knowledge taught are used by trainees when they return to work (Baldwin and Ford, 1988; Blume et al., 2010). The issue is all the more important for OHS training programs, given their dual concern for skills development and prevention, and the necessary link between the two (Cloutier et al., 2012).

While the challenges posed by the transfer of training are far from being met, knowledge in this field of study has increased considerably over the past 20 years (Baldwin et al., 2010; Grossman et Salas, 2011; Lauzier and Denis, 2016). The large number of publications over the years has enhanced our knowledge and understanding of mechanisms underlying the training transfer process. Overall, this work has resulted in the development of multiple models and diagnostic tools to assess the transfer made by trainees, and the various factors that predict it.

Many specialists on the subject have focused their energies on studying the contextual factors that could influence how well trainees transfer learning after training (Haccoun et al., 2000; Holton, 2003; Holton et al., 2001; Holton et al., 1997; Rouiller and Goldstein, 1993). One conclusion stands out: that transfer mainly occurs when the trainees' environment supports them in applying what they have just learned (Holton et al., 1997; Rouiller and Goldstein, 1993; Tannenbaum and Yukl, 1992). It appears that an increase in the level of transfer made by trainees inevitably depends on the degree of openness found by the workplace. Despite the appeal launched by some (Baldwin and Ford, 1988; Baldwin et al., 2009), it must be recognized that the understanding of the role of contextual factors in the transfer process is fragmentary in many respects. Nevertheless, the identification of elements favourable to transfer of learning is of great importance for OHS training: the organizations that will encourage their employees to do so will

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[4] Not everyone interprets transfer in the same way (e.g., proximal vs. distal): readers interested in learning more about the schools of thought regarding transfer are invited to consult Lauzier and Denis (2016), especially chapters 1 and 2.

optimize their investments in training and will be more likely to improve their injury record, especially concerning MSDs.

2.3 Conceptualizing the Transfer of Training Process

There are many theoretical models of the dynamics inherent in the process of transfer of learning (or training, as Baldwin and Ford refer to it). Despite conceptual nuances, most agree that three categories of variables identified by Baldwin and Ford (1988), play a role: (a) inputs; (b) outcomes; (c) conditions of transfer. Figure 2.1 illustrates the training transfer process as conceived by Baldwin and Ford (1988).

TRAINING INPUTS	TRAINING OUTPUTS	CONDITIONS OF TRANSFER

Trainee characteristics
•Motivation
•Ability
•Attributes (ind. differences, experiences)

Training characteristics
•Creation of a climate conducive to learning
•Application of transfer theories
•Use of self-management strategies

Work environment characteristics
•Creation of a climate conducive to transfer
•Support from co-workers and supervisors
•Opportunity to practice
•Technological support

Learning Retention

Generalization Maintenance

Figure 2.1. Theoretical model of the transfer of training process.

(adapted from Baldwin and Ford, 1988; p. 65, in Lauzier and Denis, 2016)

Inputs include the characteristics of (a) trainees; (b) the training program; (c) the work environment. The outcomes concern both what trainees have learned and their capacity to retain new knowledge: they represent the primary benefits of the training program. Some studies recognize that these outcomes are necessary conditions for the transfer of training, but that they are insufficient on their own to predict the trainees' level of transfer following a training program (Quinones, 1995). The transfer conditions symbolize the ultimate objectives of the training, i.e., the generalization of learning to multiple situations (or different contexts) and the maintenance of them over time.

2.3.1 The Characteristics of Trainees

It is important to recognize the influence of individual characteristics on the likelihood of transfer. In fact, each worker approaches the training program with a standard profile in terms of cognitive and/or motor skills, motivation, self-efficacy, past experiences and personality traits. In general, a trainee who has good skills, sufficient motivation, and a pronounced sense of self-efficacy is more likely to achieve a better level of transfer (Thayer and Teachout, 1995; cited in Kraiger 2003). A

trainee with an internal locus of control, and an elevated need for achievement will also be more likely to apply the new knowledge once back at work (Saks and Haccoun, 2010). Taking these characteristics into account before training makes it possible to proceed with an anticipatory analysis of the needs of trainees and to assess how well their profiles and the training objectives match.

2.3.2 The Characteristics of Training

A second component of the model relates to the learning process that results from training. Essentially, it consists of the course content and the manner in which the program is implemented. One of the main reasons for the poor level of transfer observed is generally due to the lack of facilitating principles in the body of the program (Saks and Haccoun, 2010). It goes without saying that this deficiency considerably reduces the possibilities for learners to build potential links between the content of the course and the performance of their tasks. Machin (2002), citing the work of McGehee and Thayer (1961), reiterates the importance of considering the following techniques in the design of training programs: (a) the use of identical elements (e.g., ensuring a level of fidelity between the practice environment and the work environment; (b) the teaching of general principles (e.g., explaining how a particular skill could be applied in new situations); (c) stimulus variability (e.g., using a variety of examples and the practice patterns); (d) the conditions of practice (e.g., increasing opportunities to practice new skills). Overall, these principles require the training program to be developed with complete and valid content, and that it be taught in such a way as to enable learners to use their new knowledge as soon as they return to work (Holton et al., 2001).

2.3.3 The Characteristics of the Working Environment

There is a great deal of research on the pronounced influence of the work environment on the transfer of training (Tannenbaum and Yukl, 1992). Overall, it consists of (a) organizational support (i.e., the support perceived or expected by trainees in the eventuality that they use their new knowledge once they return to work); (b) the transfer climate (i.e., all of the facilitating or inhibiting factors present in the work environment); (c) the culture of transfer (i.e., a culture that values the continuous acquisition of new knowledge and that considers learning as essential to the life in the organizational environment). The work environment can influence the transfer of learning both before and after the learning activity. Prior to training, its influence is generally expressed through preparing trainees (e.g., raising the awareness of trainees to the relevance and importance of their participation in the training activity). After training, this influence is in the form of organizational support (e.g., allowing trainees to practice what they have learned and to receive feedback about their performance). It is also of note that research on the work environment has revealed its influence on certain characteristics of trainees. For instance, the work of Rouillier and Goldstein (1993), and that of Tracey et al. (1995), reports that a facilitative work environment makes it possible to increase the attention of trainees, their level of motivation and self-efficacy, and their intentions to transfer what they have learned. However, a rigid work environment with little flexibility will have a dissuasive effect on trainees (Sookhai and Budworth, 2010).

In short, to improve the transfer of learning following training, one must ensure that (a) trainees use every opportunity to apply their new skills; (b) supervisors have a clear understanding of the objectives of the training program and encourage the trainees to transfer the information they have learned; (c) co-workers and supervisors provide support to trainees, in order to facilitate a better transfer of what they have learned to the workplace. It must be understood that the influence

of the various factors presented is cumulative: it is essential to recognize the dynamic and interactive characteristics of the factors influencing the transfer of learning.

2.4   Transfer and IPSMH: Considering Some Specificities

It has been noted that, because of its innovative nature, the IPSMH poses certain challenges in terms of training and transfer of learning. It should be understood that it is at odds with more traditional OHS training approaches, both in terms of design and of delivery/provision. In this study, the issue is the transfer of training by the TPs, who are themselves considered here as trainees: they are the key actors through whom new knowledge will be transmitted to the final recipients (i.e., the handlers). The purpose of this subsection is therefore to determine, on the basis of the categories of variables identified by Baldwin and Ford (1988), which of these are indispensable and should be considered in the specific context of the IPSMH.

2.4.1 TPs as Trainees and Training Dynamics

TPs have some basic attributes that are difficult to control (e.g., experience, training). They also have a number of characteristics that are considered malleable (e.g., motivation to learn and transfer, sense of self-efficacy). The question of self-efficacy is undoubtedly a major challenge for TPs, given the greater complexity of using a new pedagogical method such as the IPSMH. Changing the benchmarks and teaching methods they are familiar with has shaken up their day-to-day activities as trainers. However, despite their experience in the field, some of them must make up for any deficiencies in terms of self-efficacy[5] to be able to transfer what they have just learned and thus ensure that handlers in turn acquire and transfer what they have learned. It should be noted that the sense of self-efficacy is what ensures that TPs will set goals and maintain their efforts, despite difficult conditions (i.e., a manager who wants a shorter training session or handlers who balk at being trained, etc.).

The motivation to transfer is also an important factor. Literature on the subject suggests the existence of various types of motivation, such as the motivation to learn (Colquitt et al., 2000) and to transfer what has been learned (Gegenfurtner et al., 2009). These studies show that the motivation to learn alone cannot explain the transfer of learning. In fact, in order to motivate TPs to transfer their new knowledge, training must make it possible to respond to the following three sub-questions (Vroom, 1964): (a) *Valence*: what is the importance of the new method for trainees?; (b) *Instrumentality*: do they think they will be better able to teach and have handlers pay more attention?; (c) *Expectancy*: do they feel they have the ability to teach IPSMH? This latter aspect is related to self-efficacy. In short, through the principles and exercises it will involve, the training intended for TPs must make it possible to develop a sense of self-efficacy and to justify the importance of the IPSMH in their eyes, in order to ensure that they are highly motivated to transfer what they have learned.

2.4.2 The Characteristics of Primary and Secondary Working Environments

The workplace is probably the most important element to be considered when training TPs. In fact, TPs deal with a double reality, even a double environment. The <u>primary</u> environment is that

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[5] For Bandura (1997), self-efficacy corresponds to the perception that individuals have of their ability to perform a given task in a given context and the belief that these actions will produce the intended results.

in which the TPs carry out their interventions, i.e., directly at the client organizations' locations. Facilitating elements and barriers have a direct effect on their conduct (i.e., time pressure, working/training space layout, number of trainees per group, presence of difficult trainees, etc.). Among other factors, the complexity of the handling task for which training has been requested is a key determinant, as are certain non-negotiable requests from organizations, such as requiring a very large number of handlers to be grouped together in a single training session.

The <u>secondary</u> environment comes into play in cases where TPs are themselves employees of the organization for which they act as the training resource. Recognizing the influence of this secondary environment is undoubtedly important (e.g., quotas to be respected, training management philosophy, margin of manoeuvre available to trainers, etc.). The course of action of TPs could be partially influenced by the production imperatives to which they are bound because of their professional occupations (e.g., work load). It therefore appears essential to assess the concomitant and relative effect of these two environments on their training practices.

Training programs for TPs must therefore focus on the development of skills that enable them to better deal with the multiple realities they may face. The work of Sookhai and Budworth (2010) indicates that even with a strong sense of self-efficacy, the chances of transfer occurring are reduced if the receiving environment is recalcitrant, which is why TPs must be well informed about the specificities of their environments and thus better trained in those aspects considered to be the most determinant.

3. RESEARCH OBJECTIVES

This study has four complementary and sequential objectives:

1. ***Establishing a portrait of actors in Québec and their usual OHS training practices, especially in terms of handler training***

This first objective, which is more general in scope, provides a portrait of the OHS training situation in Québec, especially with respect to handling. A preliminary assessment of the role of primary and secondary environments on the activity of stakeholders will then be possible. The data gathered will also make it possible to define and specify the skills that should be developed as part of the "training of trainers" in the use of IPSMH, taking into account the practices currently being used and the skills they require. Finally, this investigation also aims to promote the study in order to identify potential candidates who could participate in the second component.

2. ***Providing training to a sample group of trainers and determining the effects of this "training of trainers" on various indicators to estimate the degree of transfer by learners following the training***

This objective aims to assess the effects of "training of trainers" on learners for various transfer indicators (e.g., perceived learning, motivation to transfer, perceived usefulness of concepts, sense of self-efficacy, etc.). It is the preliminary assessment of the quality of the training offered and its potential to promote the transfer of training.

3. ***Assessing and explaining the degree to which learners use and/or adapt what they have learned in the context of "training of trainers" in an actual intervention context***

This objective is central: it aims to determine the level of appropriation and transfer following training during actual interventions. The primary challenge for the trainers who have been trained will be to adapt what they have learned to the specificities of the context in which training was requested and the handling situations encountered. TPs must apply their new knowledge to new and changing situations (e.g., load characteristics, physical layouts, production demands, etc.). The ability of learners to adapt is crucial.

4. ***Optimizing the IPSMH and the training of trainers based on the results obtained***

The research team anticipates that it will not always be possible to fully implement the IPSMH: adaptations are to be expected depending on various factors (e.g., the complexity of the handling activity in question and its conditions of implementation, the concomitant and relative influences of the secondary and primary environments). The most successful adaptations will be categorized and integrated into the IPSMH improvement process. Also, depending on the level of appropriation observed among the TPs, improvements to the training of trainers will also be planned to optimize the transfer. For example, the length of time devoted to a particular topic could be increased if it is observed that has not been completely mastered by the TPs during their interventions. Other activities could also be added as needed.

4. METHODOLOGY

The methodology is structured around the four objectives enumerated above, with a section for each of them. Figure 4.1 provides an overview of the methodological approach used. The first component concerns an investigation into OHS practices in Québec, in which 104 respondents answered an online questionnaire. The second component includes the development and assessment of training for 28 trainer-practitioners (TPs) on the appropriate use of the IPSMH. The third component, which constitutes the core of the study, involves the follow-up of 19 training sessions given by 16 of the 28 TPs trained in part 2. The intention was to assess the levels of appropriation and transfer of the IPSMH during real workplace interventions. Finally, based on the findings of parts 2 and 3, the last component is devoted to improving both the IPSMH and the training of trainer-practitioners to ensure consistent use (described in subsection 1.3).

COMPONENT 1

Questionnaires about prevention practices in terms of occupational health and safety (n=104)

Establish a representative portrait of actors in Québec and their current handling training practices

| Individual variables | Contextual variables | Socio-demo. indicators | Other variables |

COMPONENT 2

Training of trainer-practitioners (TP)

Determine the potential effects of training of trainer-practitioners to ensure IPSMH provision

| Group A (n=12 participants) | Group B (n=16 participants) |

Post-training questionnaires (n=28)

COMPONENT 3

Workplace transfer–training follow-up (n=19)

Assess the degree to which learners transfer what they have learned in the scope of the "training the trainers" program in the context of actual use

| **Complete follow-up of training** (n=16 training courses/13 trainers) | **Partial follow-up of training** (n=3 training courses/3 trainers) |

COMPONENT 4

Optimization of the IPSMH and training of trainers

Figure 4.1. Overview of the four methodological components of the study.

4.1   <u>Component 1</u>: Questionnaire About Prevention Practices in Terms of OHS in Québec

A questionnaire to establish a portrait of prevention practices in the field of OHS in Québec was designed and administered over a six-month period (from May to November 2014: see Appendix 1). Available on the Internet, this self-administered SurveyMonkey®-type survey was accompanied by an information brochure and a video to promote it. Moreover, participation was encouraged through social networks, the IRSST's newsletter, prevention associations and the research team's networks. Composed of 31[6] close-ended questions, some with sub-questions, and using Likert scaling, the questionnaire consisted of two sections:

- ***Sociodemographic data and work environment*** (14 questions): age, education, activity sectors covered, workplace characteristics, importance and nature of prevention activities, etc.;
- ***Prevention practice and training activities*** (17 questions): subjects covered in training, duration of training and the preferred pedagogical approach, level of influence on their conduct, etc. Four questions in this section deal specifically with handling training.

The last part of the questionnaire consists of two open-ended questions that made it possible for respondents to provide their contact information if they were interested in participating in the follow-up to the project (component 2: monitoring the training of trainers) and making comments. One hundred and four questionnaires were completed: due to computer errors, only 59 completed the second part of the questionnaire. Occurrence analyses and percentages were generated and presented in the summary tables.

4.2   <u>Component 2</u>: The Training of Trainers and Its Effects

4.2.1 Development of the Training Content

The training content was designed by the principal investigator during the first two years of the project. The goal of training was to develop four skills:

- To identify the most problematic handling situations in the workplaces by combining different data sources;
- To describe, analyze and make judgments about ways in which workers deal with these problematic situations (handling methods);
- To identify the principal determinants of problematic situations and influence stakeholders to transform them;
- To report the results of the analyses to the workers concerned and encourage them to exchange ideas and reflect on the problems that they must solve and potential solutions.

The four-day training session, given in two blocks of two days, at two weeks apart, included 18 pedagogical activities (Table 4.1). The reader can refer to Appendix 2 for details about the pedagogical methods and the objectives pursued for each of the activities covered. Training alternated between lectures and practice and participants were always invited to make comments or ask questions: the dynamics of training were supposed to be interactive. Conceptual maps were used to present the information (see Figure 4.2 as an example). Additional information (e.g.,

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[6] Question 11 was removed from the analyses because it was ambiguous.

videos, graphs) was interspersed between the presentation of the maps. The participants had workbooks that contained all the information.
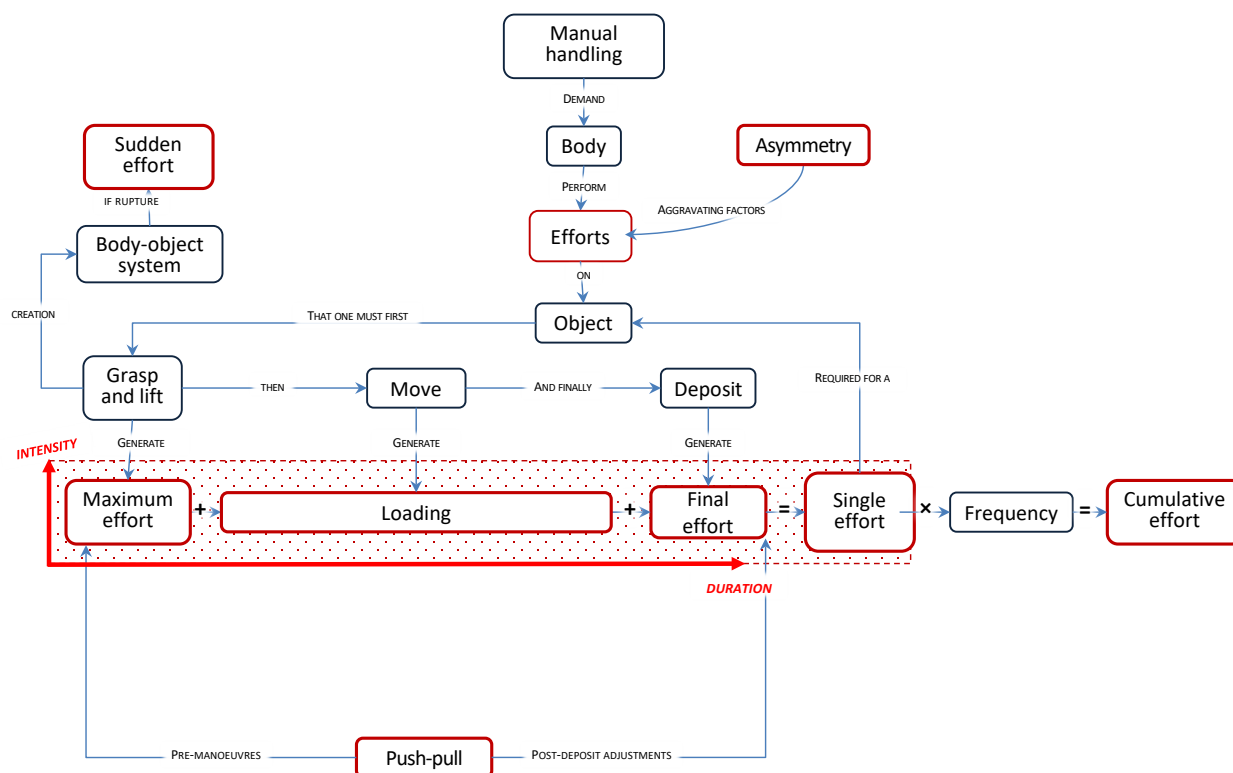
Figure 4.2. Example of a conceptual map of the types of handling efforts.

4.2.2 Training of Trainers

During the months of May and June 2015, the person responsible for the project trained two groups of TPs in the IPSMH. The TPs came from various backgrounds (health network, consultants, private enterprise, etc.) and were distributed equally between the two groups. Of the 30 people initially planned for, 28 were trained (group 1: 12 TPs; group 2: 16 TPs). The training sessions were filmed. Throughout the training program, ergonomists from the research team noted the questions being asked, the difficulties encountered by the participants, the general daily progression, etc.

In order to ensure that both groups were exposed to the same training, the videos were analyzed to calculate the duration of each planned activity (Table 4.1). Furthermore, special attention was paid to the session in which the action principles were presented, because they constitute the program's core (Table 4.2). During these observations, the participants' questions and comments were also reported as indicators of difficulties or of obstacles to appropriation: these elements will be presented in the "Results" section.

Table 4.1.   Planned and actual time (in minutes) for each group according to the training activity

Activity	Planned duration (min.)	Actual duration (min.)	
		Group 1	**Group 2**
DAY 1			
1. Welcome, introduction	60 (4%)	45 (3%)	45 (3%)
2. Particularities of handling	75 (5%)	90 (7%)	95 (7%)
3. Efforts and their effects	90 (6%)	95 (7%)	95 (7%)
4. Causes or determining factors of efforts	180 (11%)	160 (12%)	155 (11%)
DAY 2			
5. Welcome and review of day 1	30 (2%)	10 (1%)	30 (2%)
6. Presentation of the rules	30 (2%)	50 (4%)	30 (2%)
7. The four initial rules	135 (8%)	80 (6%)	90 (6%)
8. The four dynamic rules	135 (8%)	MI [1]	102 (7%)
9. Analysis of work with the rules	120 (7%)	67 (5%)[2]	53 (4%)[2]
10. Explanation of homework	30 (2%)	5 (0%)	10 (1%)
DAY 3			
11. Welcome and review of days 1 and 2	30 (2%)	10 (1%)	10 (1%)
12 and 13. Workshops	255 (16%)	130 (10%)	190 (13%)
14. Presentation of evaluation tools	90 (6%)	35 (3%)	40 (3%)
14.1 Document: for learner-friendly training	-	130 (10%)	110 (8%)
DAY 4			
15. Welcome and review of day 3	30 (2%)	10 (1%)	6 (0%)
16. IPSMH and its dynamics	255 (16%)	322 (24%)	323 (23%)
17. Review of the training and discussion[3]	60 (4%)	-	-
18. Questionnaire and comments	30 (2%)	30 (2%)	30 (2%)
Total	**27 hrs. 15 min.** **1635 min.**	**22 hrs. 57 min.** **1354 min.**	**23 hrs. 57 min.** **1414 min.**

[1.] *Missing information: incomplete video recording, which prevented an accurate calculation of the total duration.*
[2.] *The duration represents only the time spent on feedback on the analysis activity and does not include the time during which participants performed the activity together.*
[3.] *This activity was not carried out; instead, it was carried out in conjunction with activity 16.*

▮ (yellow)	*Difference of 20 to 30 min. between the two groups*
▮ (red)	*Difference > 30 min. between the two groups*

The data in Table 4.1 show that both groups were exposed to the same content and that the proportion of time spent on it was similar. The total difference between the two groups is about 60 minutes over four days of training (including missing data for activity 8 in group 1), which represents a difference of less than 5% of the total training time between the two groups. The main differences between the two groups are as follows:

- Activity 12-13/workshops: the largest gap, 60 minutes, is due to a larger number of interventions/comments and participants in group 2;

- Activity 6/presentation of the rules; Activity 5/welcome; and Activity 14.1/documentation: the differences between the two groups are about 20 to 30 minutes for these activities.

With respect to the presentation of action principles, again, both groups were exposed to the same information (Table 4.2). The only notable difference concerns the presentation of the principle of "use of the load," which can be explained by the number of contributions by participants. Intergroup comparisons show that their exposure to training content was almost identical.

Table 4.2.   Duration of presentation of each action principle for each group

Action principle	Duration (min.)	
	Group 1	Group 2
Alignment	40 (25%)	40 (22%)
Lever arm	23 (14%)	16 (9%)
Balance	15 (9%)	18 (10%)
Control	2 (1%)	6 (3%)
Transition	MI[1]	25 (14%)
Loading	27 (17%)	21 (12%)
Rhythm	16 (10%)	16 (9%)
Use of load	10 (6%)	24 (13%)
Use of body	17 (11%)	16 (9%)
Total	**160 min.**	**182 min.**

[1.]*Missing information: incomplete video recording.*

4.2.3 Post-training Questionnaires

Immediately after training, a questionnaire (52 questions: Appendix 3) was completed by the 28 TPs who had participated. The aim of the questionnaire was to gather sociodemographic data and information about indicators identified in the scientific literature as having a predictive value for the transfer of learning after training (the usefulness of perceived concepts and learning, goal orientation style, intention to transfer, sense of self-efficacy, etc.). For a complete definition of these variables, see chapter 11 in Lauzier and Denis (2016). Moreover, the reader will find the list of indicators and how they are calculated in Appendix 4. Calculations of averages, occurrences and percentages were performed, as well as t-tests.

For this questionnaire, as well as for the rest of the data collected from the TPs, an alphanumeric code was assigned: the data from this component could be cross-referenced with the data collected during component 3. A second version of this questionnaire had been planned after having observed each training participant during component 3, with the objective of comparing the results from both data collection periods to see the progress of indicators after a first training intervention. Because the response rate was very low, the data from the second post-intervention questionnaire will not be presented.

4.3   <u>Component 3</u>: **Monitoring of Training in Actual Workplaces**

Of the 28 TPs who were trained, eight were left out of the sample (Figure 4.3: in black) after citing personal reasons (e.g., job loss, pregnancy). Of the remaining 20 TPs, 16 were observed at least once during a training session using the IPSMH, while the four others did not provide training during the two year post-training of trainers follow-up period (in black). Two types of monitoring were conducted: (a) <u>complete</u> monitoring (characterized by the use of a greater number of data gathering tools), in which 13 TPs participated in 16 training sessions/cases (three TPs were observed twice); and (b) <u>partial</u> monitoring that was conducted with three TPs. Nineteen training sessions or cases were thus studied and 13 of them were filmed. They were divided into three categories according to the characteristics of the learners: (a) <u>worker cases</u>: observation of handler training (n=10 complete monitoring and three partial monitoring); (b) <u>trainer cases</u>: observations of trainer training in the workplace (n=3: e.g., supervisors, team leaders, internal trainers); (c) <u>other cases</u>: training of other groups (n=3: e.g., occupational therapists, physiotherapists, students-preventionists).

A mixed methodology was used to monitor training using various ergonomic methods: on-site observations of the provision of training (shift logs and identification of action principles), documentary analyses (trainers' presentation documents or forms used during training), logbooks filled out by the TPs and post-training interviews with TPs. All of these tools were used for training that had what was considered "complete" monitoring (n=16). For the partial monitoring (n=3), there were no on-site observations and the other tools (logbooks, documentary analyses and post-training interviews) were used retroactively, with the idea of establishing an *a posteriori* portrait of the training provided. All of these tools and their use are described in the following subsection.
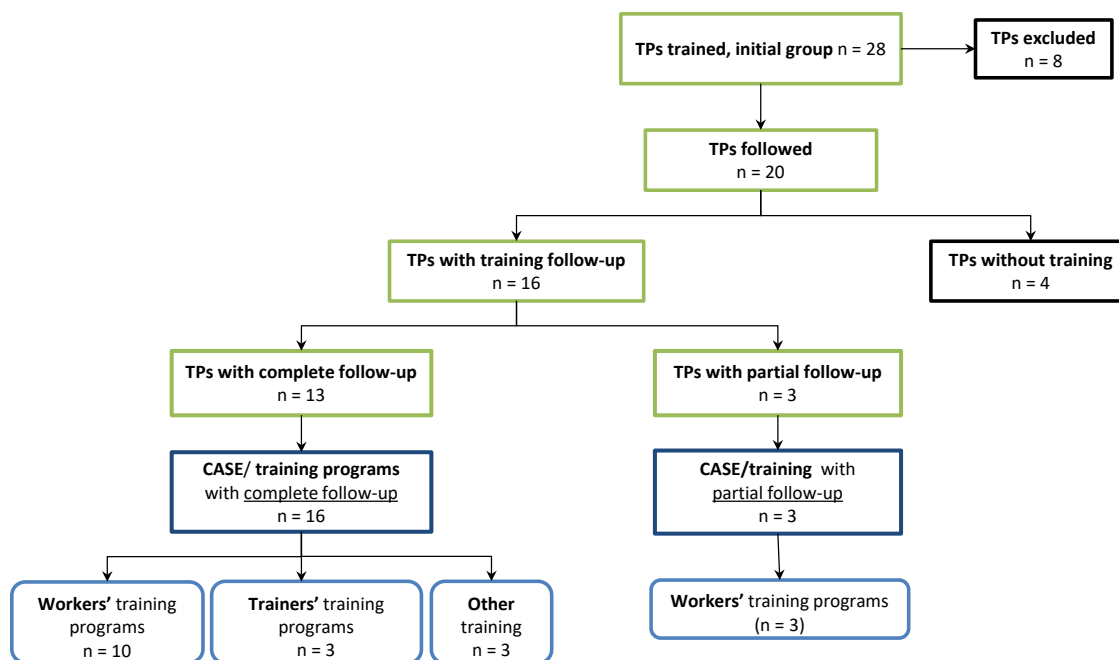
Figure 4.3. Numbers of TPs (in green) and cases (in blue) followed during the research project.

4.3.1 Data Collection Tools and Approaches

a. On-site observations and video analyses: shift logs and identification of action principles

The on-site observations of trainers' activities (total: 62 hrs. 40 min.; 46 hrs. 54 min. theory and 15 hrs. 46 min. practice) were based on a form (Appendix 5) that made it possible to find a variety of information: initial training request, impact observed, training objectives, general sequence (duration, theoretical and practical portions), participants (actors present, group size), general handling context (load type, production mode), general comments, etc.

In addition, a shift log of the trainers' activities was prepared. It was based on the identification of the previously defined major training tasks that are presented in Table 4.3. The idea was to describe the alternation between various training activities and to note when each of the principles (in terms of frequency, not duration) was mentioned. The data were then transferred into the Observer® software to generate times, frequencies and averages as well as the activity graphs (see Figure 4.4 for an example).

Table 4.3.   Categories of tasks used for the trainers' shift log

Major training tasks	Definitions
Introduction	Presentation/start of the day
Explanation of concepts	Theoretical presentation of concepts in the classroom, often with supporting media (documents, PowerPoint presentation)
Group facilitation: analysis	Practical workshops in the classroom/outside the workstations, e.g., exercises using the videos, visual exercises, practical work. No physical engagement
Group facilitation: motor	Practical workshops in the classroom/outside the workstations, e.g., exercises using the videos, visual exercises, practical work. With physical engagement
Open discussions	Participants express their concerns, no specific goal, free exchanges, the trainer supervises and lets the discussion flow
Practice: analysis	Workshops in the workstations, simulations or actual activity on the floor
Practice: motor	Practice in how to do things, techniques on the floor
Problem solving	Search for solutions to the problems raised by the participants, in the classroom or on the floor (e.g., possible transformations, equipment, etc.)
Conclusion	End of a day, of a training session. Final round table discussion, summary
Debriefing	Separate discussion with some members, with supervisors, the requesting organization, on participants' experience/perception of how training was conducted. Often concerned a subgroup

Following the collection of field data, expert judgment-type evaluations were also conducted by the ergonomist-observers on the adaptation of the training to the context, the trainers' performance and comfort levels, the difficulties associated with the handling context, good and bad results, and general comments. Finally, videos, when available, were used to complete and validate the observations.

Figure 4.4. Example of activity graph for a training session.

NOTE: **UPPER PART**: DISPLAY OF THE MAJOR TASKS AND THEIR ALTERATION. **LOWER PART**: REFERENCE TO PRINCIPLES DURING TRAINING ACCORDING TO TASKS

b. Documentation Analyses

The training documents (presentations, participants' workbooks, forms and other tools) were compiled and analyzed to complete the information.

c. Logbooks

In parallel with or after their training, the TPs were asked to complete a logbook to obtain information on the six main topics (Appendix 6): the context of the training activity (requesting organization, participants, mandate), the training activity itself (pedagogical activities, duration, conduct), the model presented in training (choice/IPSMH), the participation of handlers and the host environment, the impact of training (direct and indirect) and the trainers' reflective practice.

d. Post-training Interviews

A post-training interview was conducted with each TP. These interviews, which were recorded, were between 30 and 90 minutes long. They were intended to be open-ended with the goal of completing or validating the information. A basic framework was drawn up (Appendix 7), and was adapted to each case according to the information previously obtained through observations and the logbooks. The interview covered the same six main topics as those covered in the logbook. Verbatim transcripts of these interviews were prepared.

e. Exit Interviews with TPs Who Had Not Provided Training

For TPs who had not provided training during the research project's monitoring period, an exit interview was conducted. During this open-ended interview, the following topics were discussed (see Appendix 11): the reasons for not having training, the TP's practice and her/his workplace, the requesting workplaces, the interventions since IPSMH training and comments on the approach in general. The interviews were recorded and summaries were drafted. The results of these interviews will not be presented separately because nothing distinctive emerged from them. They were therefore aggregated with syntheses produced from other data sources.

4.3.2 Synthesis of Data: Appropriation Indicators and Determinants

All of the data gathered for each case (with one training session representing one case (Yin, 2009)) was integrated into the NVivo® software. In-depth analyses on appropriation were conducted for the worker training cases (with complete follow-up: n=10), because they represent the public originally targeted for the IPSMH and the data collected are sufficiently complete. A template to assess IPSMH appropriation was designed. It included two types of information about appropriation: indicators and determinants. An indicator shows the TPs' level of appropriation of the IPSMH. The indicators were identified from various recommendations issued during the training of the trainers to ensure its appropriate use. For example, the research team verified whether the TPs referred to the action principles, in what way, and whether there were any shifts in meaning, etc. This information made it possible to assess the TPs' level of appropriation in terms of that indicator.

An appropriation determinant is a factor that may hinder or facilitate the implementation of the IPSMH. For example, if the organization where the training takes place does not allow access to workstations, the TP must adapt the IPSMH to this reality: not having access to the workstations does not indicate a lack of appropriation (indicator), but rather results from an obstacle that limits the possibilities (determinant). Indicators and determinants were assessed by triangulating the information gathered through the various data sources.

a. Appropriation Indicators

The template includes ten appropriation indicators divided into five categories. The criteria for identifying the indicators are presented in Table 4.4:
- **Content** category (two indicators): use of the action principles and consideration for the actual work activity;
- **Means** category (two indicators): establishment of a participatory dynamic and actions to create satisfactory/adapted learning conditions;
- **Contextualization** category (two indicators): use of materials (e.g., photos or videos) or examples to illustrate actual work situations, and preliminary analyses of the context;
- **Retention** category (two indicators): transformations of work situations concomitant to training and the implementation of activities parallel to training to ensure its sustainability;
- **Duration** category (two indicators): total duration of training and relative duration of the practical (e.g., with motor engagement) and theoretical (e.g., in class) components.

The indicators were rated on a scale of 1 to 4 that, although adapted to each of them (see details in Appendix 8), is characterized by the following overall logic: (4) innovations related to the IPSMH; (3) use of the IPSMH as presented; (2) some elements of the IPSMH used; (1) far from

the IPSMH. This scale made it possible to estimate the difference between the recommendations issued for the appropriate use of the IPSMH (in the form of indicators) and its use by the TPs observed. A score of less than three therefore shows an appropriation difficulty for a given indicator. The criteria differ between the theoretical and practical parts: thus, content, means and contextualization were rated separately for each part. Retention and duration are common to both training components and are therefore only evaluated once. The indicators were evaluated for all of the ten cases of worker training. All the indicators were blind rated by two ergonomists who were present during training. When there was disagreement on certain ratings, there were discussions to establish consensus between the two ergonomists.

Finally, for each case, the ratings assigned to each indicator were added to obtain an overall level/score of appropriation. The amount could be between 10 and 64. Three levels of IPSMH appropriation could therefore be defined: 1. Exemplary appropriation (sum of ratings > or = 59, i.e., > or = to 90% of the maximum score); 2. Sufficient appropriation (sum of ratings between 37 and 58, i.e., between 50 and 89% of the maximum score); 3. Poor appropriation (sum of ratings < or = 36, i.e., < or = to 49% of the maximum score).

Table 4.4.   Categories (n=5) and appropriation indicators (n=10)

Indicators	Activity[1]	Criteria
Content		
Action principles	6, 7 and 8	Illustration; Links; Interpretation errors/use
Actual work activity	4 and 16	Activity determinants; Know-how; Strategies/difficulties/solutions; Work organization principles
Means		
Participatory approach	16	Trainer's posture, discussions; Feedback
Establishment of learning conditions[2]	16	Group size; Adaptation/ progression *Theory: workshops (motor and analysis)* *Practice: location/workplace and workshops*
Contextualization		
Material – Illustrations	9	Examples of the actual work activity
Preliminary analyses	14 and 16	Collection methods; Emblematic task identification; Material collected
Retention		
Transformation	16	Organizational, technical, etc.
Parallel activities	16	Working groups, committees; Involvement of a variety of actors
Duration		
Total duration	16	Total length of time of training
Theoretical and practical duration	16	Relative proportion of time for motor engagement (practice) versus provision of theoretical concepts

1: Pedagogical activity in which the recommendation(s) concerning the indicator were covered; 2: Specific criteria for the practical and theoretical parts.

b. Appropriation Determinants

Four categories of appropriation determinants were identified (the details about assessing them is presented in Appendix 9) and identified as facilitating or restrictive factors:

- **Employer** category**:** secondary environment, i.e., the characteristics of the TP's employer;
- **Organization** category**:** primary environment, i.e., the characteristics of the organization requesting training;
- **Trainer-practitioner (TP)** category**:** the characteristics of the TP that may play a role in appropriation of the IPSMH;
- **Tasks and learners** category**:** the difficulty/complexity of handling tasks for which training is provided and the learners' characteristics.

Unlike the appropriation indicators, which were predefined and evaluated with a scale of four aspects of retention (1 to 4: see previous page), only these four major categories of appropriation determinants were previously defined. The elements related to each of them were identified as the study progressed. Thus, the weight of a determinant was estimated based on the number of times it was observed and/or reported by TPs. For example, several TPs may report a significant workload (**employer** category) that affects the way they use the IPSMH and the trade-offs that they must make to implement it.

c. Summary of the Appropriation Data

After all of these analyses were performed, a synthesis diagram presenting the results for each case was constructed (see an example in Figure 4.5). It includes all the categories and variables described above, in concise graphic form. Taking into account the significant amount of data, choices in presentation were made. Thus, an initial presentation of the results will aggregate the data from all the cases of training provided to workers (n=10) so that the reader will have an overview of the appropriation level of all the TPs. Secondly, three contrasting cases will be presented according to the configuration of Figure 4.5: one case in which the IPSMH has been the subject of exemplary appropriation, one case of satisfactory appropriation and one final case for which appropriation is deemed insufficient. In this way, the characteristics specific to each of these three levels of appropriation were able to be identified in order to establish the principal determinants that may have influenced the use of the IPSMH.

4.3.3 Theoretical Part: Analysis of Principles for Worker Training

Additional analyses on more than half of the theoretical portions of worker training cases were conducted. The verbatim reports of six theoretical portions of training were produced from the available videos, representing 8 hours and 31 minutes of listening. Content analyses were then conducted using NVivo® software to find references to the action principles in this corpus of verbatim reports and to determine how they were used (see Appendix 10 for a brief description of the nine action principles: for a more complete description, the reader can consult Denis et al., 2011a). The analyses made it possible to identify the references to principles, as well as the most common associations among them. The data will be presented visually in the form of occurrences.
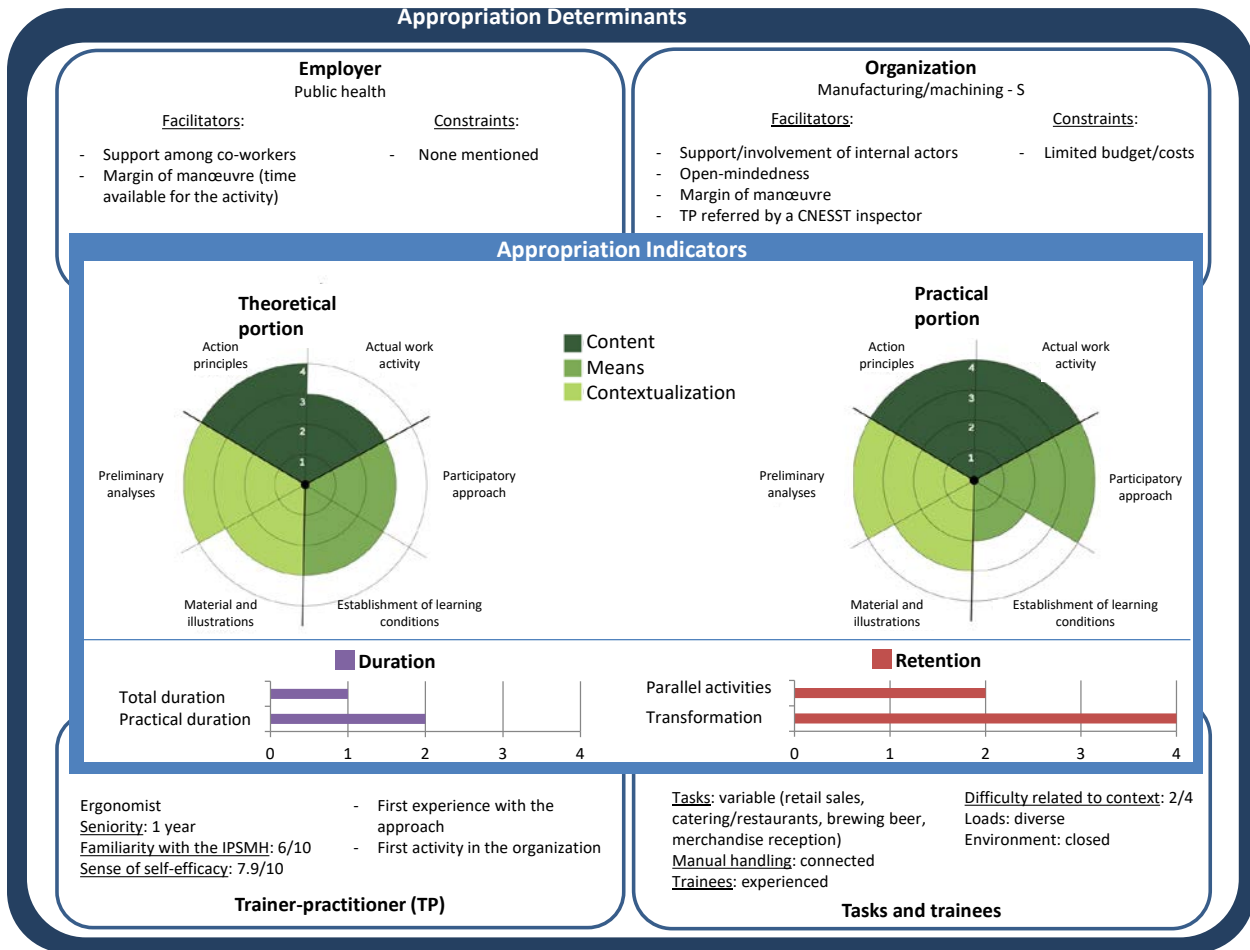
Figure 4.5. Summary of appropriation in one case

NOTE: ***WITHIN THE DIAGRAM***: *THE APPROPRIATION INDICATORS (LIGHT BLUE BOX) AND THEIR RESPECTIVE RATINGS;*
ABOVE AND BELOW: *THE APPROPRIATION DETERMINANTS (DARKER BLUE BOX) DIVIDED INTO 4 CATEGORIES*

4.4   <u>Component 4</u>: Improvement of the IPSMH and Training of Trainers

Based on the results gathered for components 2 and 3 and their analysis by the research team, proposals for improvements to both the IPSMH and the training of trainers were identified (n=10). Some intermediate results were also presented during a three-hour validation meeting held at the end of the monitoring period with 12 TPs to gather their immediate reactions and comments. The TPs were thus able to explain certain choices that they had made, qualify certain results and provide additional information.

The improvements to the IPSMH came mainly from the changes (or additions) that the TPs had made during their interventions in order to adapt to the context. The idea is to offer more possibilities to the TPs in the implementation of the approach according to the realities they face, instead of suggesting a single way of doing things. The role played by the appropriation determinants has been central to our suggestions to improve the IPSMH. Improvements to the training of trainers are based more on appropriation indicators. The lowest rated appropriation

indicators were analyzed to see how we could improve the training given to TPs to enhance its effectiveness. For example, improvements may involve increasing the duration of a given learning activity, or even adding activities that were not initially planned to compensate for observed deficiencies. This component will not be included in the results. Instead, we have opted for a more reader-friendly approach. Thus, each improvement proposal will be the subject of an insert in the section in which we discuss the results: at the appropriate time, the inserts will provide explanations of how the IPSMH and/or the training of trainer-practitioners will be improved. Appendix 13 summarizes these improvement suggestions and their practical implementation.

Overview of the use of the action principles in handling training

The action principles constitute the basis of IPSMH educational material. Using these nine principles (Appendix 10), it is possible to describe handling techniques in any context. The principles are interrelated and become meaningful through their interactions: the gestures and movements required for handling simultaneously integrate most of the principles to varying degrees. They provide a useful framework for reading about the techniques used by handlers to try to interpret them, always in terms of the context. Our perspective is that the situation, in interaction with handlers' personal characteristics, dictates priorities and points toward the best action to take.

For handlers, a principle is a goal to be reached. Depending on the context and the possibilities open to them, they must decide how best to do things. It is this possibility of adapting the action principles to a variety of contexts that constitutes their importance. The principles contribute to understanding the motor components involved in how handlers move, thus facilitating exchanges with them. In fact, the principles constitute a base for communication that facilitates mutual understanding. They become a gestural code for handlers. For trainers, it provides the opportunity to better understand the choices handlers make, how they exercise their judgment, and opens the way to exchanges to understand the compromises made and to discuss the potential consequences.

We believe that the concept of the action principle is a powerful tool for understanding handling activities. First, the principles help explain the action, by making it possible to comment on the ways of doing things above and beyond traditional postural aspects. The principles become a catalyst for raising awareness: they contribute to the understanding and realization of the action. This framework for reading becomes useful to handlers to help them take a critical look at their activity, to explain or to better understand what is successful and what is less so or to gain insight into the possibilities of adapting it to other situations. In support of a reflective approach initiated by a trainer, the principles help learners become aware of solutions to "operational" obstacles (e.g., lack of space, unstable loads, clutter, poorly designed assistance equipment).

5. RESULTS

5.1   Component 1: OHS Prevention Practices in Québec

5.1.1 Who Works in Prevention and Where?

The majority of respondents are women, are over 40 years old, have more than 10 years of OHS experience and are university educated (Table 5.1). They mainly work within large organizations and half of them have more than ten years of seniority in their organizations.

Table 5.1.   Respondents' characteristics and their workplaces (n=104)

Respondents' characteristics	Workforce (%)	Workplace characteristics	Workforce (%)
Gender	3 MD[1]	*Organization type*	
Male	44 (42%)	Self employed	11 (11%)
Female	57 (55%)	Other than public	55 (53%)
		Public and parapublic	38 (36%)
Age	7 DM	*Organization size*	
20-29	9 (9%)	Very small	19 (18%)
30-39	26 (25%)	Small	5 (5%)
40-49	24 (23%)	Medium	13 (12%)
> 50	38 (37%)	Large	62 (60%)
		Not available	5 (5%)
Education	4 DM	*Experience in this environment*	4 DM
High school	5 (5%)	< 5 years	33 (32%)
College	25 (24%)	5-9 years	15 (14%)
Bachelor	31 (30%)	10-19 years	34 (33%)
Post-graduate	39 (37%)	> 20 years	18 (17%)
OHS experience			
< 5 years	19 (18%)		
5-9 years	20 (19%)		
10-19 years	39 (38%)		
> or = 20 years	26 (25%)		

[1]: *Missing data.*

5.1.2 What are the Practices of OHS Stakeholders in Québec?

The respondents work in several sectors of economic activity and in every region in Québec. However, the greater Montréal region is the most highly represented in the sample (Table 5.2). While goods production sectors (primary/secondary) are invested in this type of training, more practitioners are involved in the service sector (80%). Almost one intervention in two takes place in large organizations. Forty percent of respondents said that over 50% of their time was devoted to OHS activities. These activities, while they take many forms, are mainly concentrated in organizing information and training sessions (90%). The proportion of interventions dedicated to

handling suggests that respondents are not specialists in this work-related activity: slightly fewer than one in four respondents devotes more than 40% of their working time to it. In fact, our analyses show that these practitioners must master wide range of topics, but they spend less than 30% of their time on them. Almost eight out of ten practitioners said that they act in a way that transforms work conditions (e.g., action taken regarding facilities, equipment).

Table 5.2.   Respondents' general practices (n=104)

Characteristics related to respondents' practices	Workforce (%)
Activity sectors where interventions take place	
Service sector: health care, teaching, accommodation, etc.	83 (80%)
Primary industries, public services and construction	44 (42%)
Manufacturing industries and repair and maintenance services	44 (42%)
Size of organizations where interventions take place	1 MD[1]
Very small	7 (7%)
Small	18 (17%)
Medium	25 (24%)
Large	49 (47%)
NSP	4 (4%)
Geographic sector covered	
Montréal	35 (36%)
Montérégie	33 (34%)
Québec City	19 (20%)
Other regions	45 (43%)
Portion of activities devoted to OHS	
10% - 30% of professional activity	48 (46%)
40% - 50% of professional activity	15 (14%)
60% - 80% of professional activity	11 (11%)
> 80% of professional activity	30 (29%)
Portion of activities devoted specifically to handling	
0 - 30%	35 (33.6%)
40% - 60%	9 (8.7%)
≥ 70%	15 (14.4%)
Prevention activity	
OHS information and training	88 (90%)
Development and monitoring of prevention plans, risk identification, inspections and preventive activities, participation in HSC, health monitoring	80 (82%)
Actions on facilities, equipment and PPE, actions on work methods and organization	77 (79%)
Accident management and analysis (investigations), management of CNSST files	59 (60%)
Emergency measures and first aid	42 (43%)
Management of disabilities, return to work, rehabilitation, temporary assignments	41 (42%)
Other (management/corporate interaction, reports, drafting articles, committees)	25 (26%)

1: Missing data.

5.1.3 What Are the Specific Characteristics of Training?

Identified as the dominant practice, training programs take less than half a day: fewer than one in four training programs run over a full day or more (Table 5.3). The respondents report that they spread their training programs over more than one session. Group size is small: close to 80% of training programs have five or fewer participants.

Table 5.3.   Characteristics of training offered (n=104)

Characteristic	Workforce (%)
Duration	
< half day	80 (77%)
± one day	12 (11%)
> day	12 (12%)
Group size	9 MD[1]
1 to 3 participants	39 (38%)
4 to 5 participants	41 (39%)
6 to 10 participants	12 (12%)
> 10 participants	3 (3%)
Training sequence	
One session	22 (21%)
Several sessions	82 (79%)
Subject discussed most often	
MSD prevention and physical risks	43 (41%)
Handling, safe transportation of loads	38 (37%)
Office ergonomics	30 (29%)
Forklift trucks	24 (23%)
Accident investigation and analysis	18 (17%)
WHMIS	17 (16%)
Lockout	16 (15%)
Chemical and/or biological risks	18 (17%)
Workplace inspection	14 (13%)
OHS standards and legislation	13 (13%)
Respiratory protection	11 (11%)
Confined spaces	9 (9%)
HSC operation	9 (9%)
Machine safety	9 (9%)
Other (new arrivals, psychological health, first aid, etc.)	16 (15%)
Handling training is different than general training in terms of…[2]	
the possibility of having learners practice	28 (27%)
training duration	26 (25%)
participant interest/motivation	24 (23%)
the time devoted to preparation	23 (22%)
the number of participants	18 (17%)

1: Missing data; 2: different responses are reported (completely different, very different and different).

The subjects dealt with in training are varied. While specialized in OHS, the fields covered suggest that the practitioners must master several related subjects. Handling is the second most covered topic in training, with MSD prevention, office ergonomics and forklift truck driving. Respondents report that handling training is distinctive from other training provided, and therefore requires adjustments.

5.1.4   What Is the Dominant Pedagogical Approach of Practitioners?

The analysis of the pedagogical methods reported by the practitioners suggests that most of them favour a lecture-based teaching approach in which slideshows are the preferred pedagogical support (Table 5.4). The concrete application of the concepts covered involved fewer than one in two training programs (46%). Most respondents report having a great deal of influence over several parameters that have an impact on the training dynamic, such as the number of participants, the duration or the location. The possibility of having their trainees practice is the factor over which they have the least control. This suggests that practitioners are generally able to "negotiate" and obtain the training conditions they consider necessary to achieve their objectives.

Table 5.4.   Most used pedagogical methods and degree of influence on the training approaches (n=104)

Characteristic	Workforce (%)
Pedagogical method most used[1]	
Lecture	71 (68%)
Discussion	68 (65.4%)
Demonstration	63 (60.6%)
Training in the task (practicing new skills)	48 (46.1%)
Most used support/tool[1]	
Slideshow	83 (79.8%)
Videos	52 (50%)
One or more case study	43 (41.3%)
Learners' guide	42 (40.4%)
Checklist	45 (43.2%)
Practitioners' degree of influence on the organization of training[1]	
Topics discussed in training	85 (81.8%)
Duration of training	81 (77.9%)
Where training takes place	76 (73%)
Number of participants	75 (72.1%)
Possibility of having learners practice during training	55 (52.9%)

[1]: *Combination of the responses "quite often" and "always."*

5.1.5   Do Training Programs Promote Transfer and Under What Conditions?

The respondents considered transfer rates to be quite low (62% immediately after training), with a significant decline within about one month after training (Table 5.5). The learner has the most

control over transfer, followed by environmental factors: the trainer's responsibility comes last (22%).

Table 5.5.   Transfer of learning and learners attitudes (n=59)

Characteristic	Workforce (%)
When transfer of learning occurs	14 MD[1]
Immediately after training	62%
One month after training	36%
Six months after training	32%
Responsibility for transfer of learning	4 MD
Learners	31%
The organization	24%
Immediate supervisors	24%
Trainers	22%
Reason for lack of transfer of learning[2]	
Related to the organization	
At work, the learners are not evaluated or compensated for the use they make of the knowledge and skills recently acquired in training	35 (34%)
At work, use of knowledge and skills recently acquired in training is not valued	23 (22%)
At work, the immediate supervisor does not encourage the application of the knowledge and skills recently acquired in training	16 (15%)
At work, the learners' co-workers do not encourage the application of the new knowledge and skills	13 (13%)
Learners lack the opportunity to apply their new knowledge and skills in their work	13 (13%)
Related to learners	
The learners do not attach much importance to the concepts and information taught in the scope of training	11 (11%)
The learners are not motivated to use their new knowledge and skills in the scope of their jobs	9 (9%)
Related to training	
Training does not devote much time to practice and repetition of new skills	32 (31%)
Average attitude of learners[3]	
Learners are motivated by the idea of using their new knowledge at work	7.25 (SD: 1.81)
Learners intend to apply the concepts and information taught	7.19 (SD: 1.69)
Learners master the concepts and information taught	6.81 (SD: 1.46)
Learners use the means necessary to transfer their new learning	6.49 (SD: 2.06)

1: Missing data; 2: Combination of the responses "Agree" and "Totally agree"; 3: Responses on a scale of 1 to 10. SD: standard deviation.

The low transfer rate perceived by TPs can be explained by two factors: a lack of workplace incentives to encourage the use of new knowledge and a lack of practice in the use of the new skills acquired in the scope of training. Overall, the practitioners have a very positive opinion of

learners: they say they are motivated, ready to learn and to transfer what they have learned after the training program.

Summary of <u>component 1</u>: Key ideas to keep in mind

- The practice of those who responded to the questionnaire is focused mainly on organizing and providing information and training sessions. Although these prevention activities are diversified, the prevailing trend observed is to use educational approaches for workers. With an average of ten years of experience as trainers, the respondents can be considered as OHS training specialists;

- Handling is one of the subjects covered in these sessions. While in high demand, a number of other OHS topics are also very popular. The practitioners, with a few exceptions, are therefore mainly OHS generalists rather than specialists in a specific area, including handling;

- The respondents report having a strong influence on many parameters related to provision of these information/training sessions, such as choice of content, duration and number of participants involved: their margin of manoeuvre appears significant;

- Information/training sessions are brief and provided using an approach referred to as "transmission." This is a traditional pedagogical model, still very dominant in educational circles. The active involvement of learners in the practical implementation of the concepts taught is rare;

- The practitioners have a very positive opinion of the people they are asked to train, attributing a high level of responsibility to them in whether or not they transfer their knowledge when they return to work; their own responsibility in this respect is considered as being less important and almost equivalent to that of organizations and immediate superiors;

- They are, however, quite critical of the transfer rates to be expected as a result of the training that they provide, with two main reasons given (among a long list of explanatory factors): a lack of workplace initiatives to encourage trainees to use their new knowledge, and the lack of practice in using the new skills acquired in training. It is not the lack of will/motivation of the trainees that is the cause of these low transfer rates anticipated, but the fact that they are not given the means to do so;

Although actions are being put in place to optimize working conditions, they do not seem to target the factors explaining these low transfer rates. For example, there will be less attempt to influence the support of the immediate supervisors in the learners' transfer process, whereas their role is widely recognized as one of the key factors in the learning transfer process.

5.2   <u>Component 2</u>: Characteristics of the Training of Trainers and Its Effects

The training provided to TPs was described in the methodology section. In this section, we will first describe the characteristics of TPs who were trained and who continued to participate in component 3 (5.2.1). We will then present their perceptions of the training, as gathered through a questionnaire administered at the end of the four days of training (5.2.2). We will complete this with the presentation of the TPs' comments and questions throughout the training, an indicator of their concerns (5.2.3).

5.2.1 What Are the Characteristics of the TPs Trained?

Here and following, only information concerning the TPs who continued their participation in the research project for component 3 (n=20 TPs) will be presented. In fact, some TPs (n=8) had to withdraw from the project for various reasons (e.g., change or loss of employment, health reasons, etc.). Information about how the TPs provided training (n=16) or not (n=4) for component 3 will be presented.

The groups of TPs included an equal number of men and women, and the average age was slightly over 40 (Table 5.6). Most of them have a postgraduate university degree and are ergonomists (80%). One in three TPs work in public health, but it should be noted that the sample included practitioners from various organizations where OHS practitioners often work. On average, the TPs had nearly 10 years of seniority within their organization and as many years as trainers. They had been providing handling training on average for about six years: note that the four TPs who did not provide training (component 3) had practically twice as much experience as material handling trainers, although the standard deviation suggests a great deal of variability in terms of experience for this group. On average, the TPs reported that they were already quite familiar with the IPSMH. In our view, the most noteworthy difference between the two groups was that the four TPs who had not provided training said they were less familiar with the new training approach. While statistical tests detected no significant difference due to the low sample size, this is a strong trend.

5.2.2 TPs' Post-training Perception

The perception of TPs following the training of trainers is very positive: the perceived usefulness of the concepts taught (6.4/7) and the intention to transfer what they learned in future interventions (6.2/7) score high (Table 5.7): they are both strong predictors of transfer. Although they still scored high, the mastery of what was learned is perceived as being lower (5.2/7): it should be noted that although this factor may be influenced by training, it is more related to individuals and is less malleable than the other predictors. The lowest scores are recorded for performance and avoidance: the difference between the two groups is the greatest for the latter factor.

On average, the TPs reported a strong sense of self-efficacy (8.4/10). There is a significant correlation ($r(20) = 0.497$, $p < 0.05$) between the level of familiarity with the IPSMH and the sense of self-efficacy in this sample. The TPs also feel that they continued to learn after training in all three dimensions evaluated, with high post-training scores (close to 9/10).

Table 5.6.   TPs' sociodemographic and workplace characteristics (n=20)

TPs' characteristics	TPs with training follow-up (n = 16)	TPs without training follow-up (n = 4)	Total (TPs) (n = 20)
Sociodemographic characteristics			
Gender			
Male	5 (31%)	4 (100%)	9 (45%)
Female	11 (69%)	-	11 (55%)
Average age	41.3 (±9.55)	41.5 (±7.59)	41.3 (±9.01)
Education level			
College	1 (6%)	-	1 (5%)
Bachelor	1 (6%)	1 (25%)	2 (10%)
DESS or Master	14 (88%)	3 (75%)	17 (85%)
Educational field[1]			
Ergonomics	13 (81%)	3 (75%)	16 (80%)
Other[2]	3 (19%)	1 (25%)	4 (20%)
TPs workplace			
Type of organization/Employer			
Public health	5 (31%)	1 (25%)	6 (30%)
Consulting service (private)	4 (25%)	-	4 (20%)
ASP[3]	2 (13%)	1 (25%)	3 (15%)
Private enterprise	2 (13%)	-	2 (10%)
Self-employed worker	1 (6%)	1 (25%)	2 (10%)
Other[4]	2 (13%)	1 (25%)	3 (15%)
Position			
OHS counsellor	4 (25%)	-	4 (20%)
Ergonomist	9 (56%)	3 (75%)	12 (60%)
Ergonomist/Occupational therapist	2 (13%)	-	2 (10%)
Operator-trainer	1 (6%)	-	1 (5%)
Other[5]	-	1 (25%)	1 (5%)
Average seniority (years)	9.6 (±5.40)	8.5 (±7.05)	9.4 (±6.52)
Average training experience (years)			
General training[6]	9.9 (±5.40)	12.3 (±10.24)	10.4 (±6.37)
Handling training	5.2 (±4.46)	9.3 (±6.55)	6.0 (±5.03)
Familiarity with the approach[7] (av.)	5.9 (±2.70)	3.0 (±2.00)	5.3 (±2.79)

[1]: Field of study: related to the highest level of education completed; [2]: Other: physiotherapy, psychology, occupational psychology, chemistry, etc.; [3.] JSA: Joint sector-based association; [4.] Other: e.g., university, hospital, consulting service (NPO); [5.] Other: e.g., physiotherapist; [6.] General training: all training type/subjects (self-reported); [7] Familiarity with the IPSMH pre-training of TP (self-reported): scale of 1 to 10 (10: very familiar).

Table 5.7.   Perceptions of TPs after receiving trainer training (n=20)

Perception of TPs	TPs with training follow-up (n = 16)	TPs without training follow-up (n = 4)	Total (n = 20)
Perceived usefulness [1]	6.5 (± 0.63)	6.0 (± 0.74)	6.4 (± 0.66)
Mastery of learning[1]	5.2 (± 1.04)	5.4 (± 0.85)	5.2 (± 0.99)
Performance[1]	4.2 (± 0.76)	4.4 (± 0.38)	4.3 (± 0.70)
Avoidance[1]	3.6 (± 1.02)	2.8 (± 1.48)	3.4 (± 1.12)
Intention to transfer[1]	6.2 (± 0.66)	6.5 (± 0.13)	6.2 (± 0.60)
Sense of self-efficacy[2]	8.4 (± 0.90)	8.3 (± 1.08)	8.4 (± 0.91)
Perceived learning[2]:			
Recognize problematic handling situations in the workplace			
Before training	6.9 (± 1.98)	7.5 (± 2.08)	7.1 (± 1.96)
After training	8.9 (± 0.77)	9.0 (± 0.82)	9.0 (± 0.76)
Giving relevant and complete feedback about handling techniques applied to workers			
Before training	6.6 (± 1.90)	7.3 (± 1.71)	6.7 (± 1.84)
After training	8.5 (± 0.97)	8.5 (± 0.58)	8.5 (± 0.89)
Getting participants to adopt a new handling approach based on the rules			
Before training	6.0 (± 2.56)	4.8 (± 1.5)	5.8 (± 2.40)
After training	8.9 (± 0.72)	8.0 (± 0.82)	8.7 (± 0.80)

1: Scale from 1 to 7 (7: strongly agree); 2: Scale from 1 to 10 (10: excellent).

5.2.3 TPs' Questions and Comments During Training

Table 5.8 summarizes the number of questions and comments formulated by the two groups of TPs, for each pedagogical activity covered (see Table 4.1 for more details). The number of questions and comments is similar between the two groups: there are many more comments than questions (223 vs. 61). The analysis of the nature of the questions/comments indicates that there were few queries in terms of incomprehension of the subject matter, beyond requests for clarification or to deepen understanding of it (e.g., whether the standards would apply if one wanted to design handling assistance equipment).

The action principles gave rise to several comments, but few questions (Table 5.9). The principle of "transition" gave rise to the most remarks, followed by balance and the use of the body. These data do not point to the identification of specific difficulties related to the subject covered in training. They confirm the dynamic nature of the training, through the many exchanges and discussions it generated.

Table 5.8.   Number of questions and comments from TPs by pedagogical activity (n=20)

Activity[1]	Group 1		Group 2		Total	
	Comm.	Quest.	Comm.	Quest.	Comm.	Quest.
DAY 1						
1	-	1 (3.2%)	-	-	-	1 (1.6%)
2	10 (9.3%)	4 (12.9%)	8 (7.0%)	7 (23.3%)	18 (8.1%)	11 (18.0%)
3	4 (3.7%)	2 (6.5%)	7 (6.1%)	4 (13.3%)	11 (4.9%)	6 (9.8%)
4	16 (14.8%)	5 (16.1%)	13 (11.3%)	5 (16.7%)	29 (13.0%)	10 (16.4%)
DAY 2						
5	-	-	2 (1.7%)	1 (3.3%)	2 (0.9%)	1 (1.6%)
6	6 (5.6%)	-	-	-	6 (2.7%)	-
7	3 (2.8%)	6 (19.4%)	7 (6.1%)	3 (10.0%)	10 (4.5%)	9 (14.8%)
8	6 (5.6%)	1 (3.2%)	7 (6.1%)	2 (6.7%)	13 (5.8%)	3 (4.9%)
9	16 (14.8%)	1 (3.2%)	20 (17.4%)	1 (3.3%)	36 (16.1%)	2 (3.3%)
10	1 (0.9%)	-	-		1 (0.5%)	
DAY 3						
11	-	-	-	-	-	-
12 / 13	5 (4.6%)	-	8 (7.0%)	-	13 (5.8%)	-
14	1 (0.9%)	2 (6.5%)	-	6 (20.0%)	1 (0.5%)	8 (13.1%)
14.1	6 (5.6%)	1 (3.2%)	7 (6.1%)	1 (3.3%)	13 (5.8%)	2 (3.3)
DAY 4						
15	-	-	-	-	-	-
16	34 (31.5%)	7 (22.6%)	36 (31.3%)	1 (3.3%)	70 (31.4%)	8 (13.1%)
17	-	-	-	-	-	-
18	-	-	-	-	-	-
Total	**108**	**31**	**115**	**30**	**223**	**61**

1 : See Table 4.1 for details of pedagogical activities. Comm.: Comment/discussion; Quest.: Questions.

Table 5.9.   Number of questions and comments from TPs related to the action principles (n=20)

Action rules	Group 1		Group 2		Total[1]
	Comments	**Questions**	**Comments**	**Questions**	
Alignment	3 (9%)	-	6 (17%)	-	9
Lever arm	2 (6%)	1 (25%)	1 (3%)	-	4
Balance	4 (12%)	2 (50%)	4 (11%)	1 (50%)	11
Grip	4 (12%)	-	3 (9%)	-	7
Transition	9 (27%)	-	5 (14%)	1 (50%)	15
Loading	2 (6%)	-	4 (11%)	-	6
Rhythm	2 (6%)	-	3 (9%)	-	5
Use of the load	2 (6%)	-	6 (17%)	-	8
Use of the body	6 (18%)	1 (25%)	3 (9%)	-	10
Total	**34**	**4**	**35**	**2**	

[1]: Comments + questions.

Summary of <u>component 2</u>: Key ideas to keep in mind

- The TPs trained in the IPSMH come from various backgrounds previously identified in the survey conducted in component 1. Their seniority, both as OHS practitioners and as trainers, is also similar to that of the survey respondents. However, the sample has a high proportion of ergonomists. They were also quite familiar with the IPSMH, even before they began the train-the-trainers course;

- TPs have a very positive opinion of the training they received: they feel that the concepts they learned are useful, that they think they have mastered them well and intend to transfer their knowledge during future interventions. Their sense of self-efficacy, a strong predictor of transfer, is, on average, very high: it is also significantly correlated with the level of familiarity of TPs with the IPSMH;

- Compared to their knowledge level before training, TPs report notable improvement after the four days of training received. These results, combined with the two previous points, suggest a strong potential of transfer of the IPSMH by the TPs;

- The analysis of the dynamics of trainer training, through the interactions between the trainer and the TPs, reveals very few indications of incomprehension among the latter group. The TPs were actively involved in the training process and were able to express themselves and exchange ideas with the trainer and their peers;

- Familiarity with the IPSMH before training appears to be the factor that most distinguishes TPs who had begun using the IPSMH from those who had not.

5.3   Component 3: Monitoring of TP Training Interventions

This section of results constitutes the central portion of the research and consists of four parts. The first part presents some general characteristics of the 19 training sessions given by the TPs (n=16): information about the environments in which they took place, the handling activities concerned, and their formats, mandates and the objectives pursued (5.3.1). In the second part, we describe the training process (n=16) via the various tasks covered by the TPs, again emphasizing the use of the handling action principles (5.3.2). The third part presents the results of IPSMH appropriation levels by the TPs (n=10) via appropriation indicators and determinants (5.3.3). Moreover, three distinctive cases of appropriation levels will be presented in more detail so that the reader can get a better idea of the concrete dynamics of training programs and the determinants that influence them. The final part deals with the results of in-depth analyses of the theoretical portions of five of the six training programs for which we have video recordings (5.3.4). For the purposes of this report, only the analyses of the use of the action principles are presented: we report on how the TPs combine the principles to describe and comment on handling techniques.

5.3.1 Main Characteristics of Training Provided by the TPs

The training provided by the TPs took place mainly in large goods-producing companies working in the logistics and manufacturing/processing sectors, where handling is most often at the heart of production activities (Table 5.10). Note that trainer training, despite the small sample (n=3), was all given in companies that are perceived by the TPs as being proactive in matters of prevention. We will see that these training programs are generally longer, and thus require more investment.

The handling activity that is the subject of training is a related/secondary task in the work of trainees in almost half the cases: therefore, training needs do not solely concern people for whom it is the principal/central activity. The handling activities subject to training are generally of a level of difficulty that we estimate as being quite low (<or equal to 2/4). This estimate is based on the combined assessment of the wide variety of the loads handled and the fact that the environment is either "open" (e.g., delivery to various clients) or "closed" (e.g., a supply station): the variability of the context is therefore the factor used to explain the difficulty of a given handling activity (see Appendix 9). Thus, only four training programs were rated at the highest difficulty threshold, i.e., a combination of heterogeneous loads in an open environment, which is a highly variable context.

With respect to the characteristics of training programs provided by the TPs, just over half lasted less than half a day (Table 5.11). In fact, only one in four lasted more than a day: only two training programs lasted more than two days. Training of trainers tends to take longer: in these cases, longer training periods are observed for both the practical and theoretical parts. Almost two thirds of the training programs alternate between a classroom and the trainees' work site, but not necessarily during the normal course of production. The trainers tend to limit the number of trainees per group in the practical part compared to the theoretical part, although in both cases, the total number of participants per group is quite low (< 10 participants). Finally, the TPs feel that the trainees they train are proactive in their learning and this is reflected by participants showing interest in the training received: the TP perceive the trainees as being receptive to this new training approach.

Table 5.10.   Characteristics of the workplaces where training is requested and of the handling activity (n=19)

Characteristics	Training			Total (n = 19)
	Worker (n = 13)	Trainer (n = 3)	Other (n = 3)	
Organization characteristics				
Sector of activity				
Logistics[1]	4	2	-	6 (32%)
Manufacturing/machining/ processing[2]	5	1	-	6 (32%)
Public services[3]	3	-	-	3 (16%)
Agriculture	1	-	-	1 (5%)
Other	-	-	3	3 (16%)
Organization size				
Large	9	2	-	11 (58%)
Very small, small and medium	4	1	1	6 (32%)
N/D or I[4]	-	-	2	2 (11%)
Production				
Goods	8	3	-	11 (58%)
Services	5	-	3	8 (42%)
OHS maturity				
Reactive	6	-	-	6 (32%)
Proactive	4	3	-	7 (37%)
N/D or I	3	-	3	6 (32%)
Handling characteristics				
Handling tasks				
Connected	9	-	I	9
Central	4	3	I	7
Difficulty in terms of context				
1/4	3	-	I	3
2/4	6	3	I	9
3/4	-	-	I	-
4/4	4	-	I	4

1. *Logistics: storage, delivery, etc.;* 2.*Manufacturing/machining/processing: production of goods or food product processing;* 3. *Public services: maintenance, repair, landscaping, garbage collection, etc.;* 4: *N/D or I : Not defined or inapplicable.*

Table 5.11.   General characteristics of training programs (n=19)

Characteristic	Training Worker (n = 13)	Trainer (n = 3)	Other (n = 3)	Total (n = 19)
Total duration				
Less than ½ day	10 (77%)	-	-	10 (53%)
½ day to 1 day	1 (8%)	1 (33%)	2 (67%)	4 (21%)
From 1 to 2 days	-	2 (67%)	1 (33%)	3 (16%)
> 2 days	2 (15%)	-	-	2 (11%)
Duration of theory				
Less than ½ day	12 (92%)	-	-	12 (63%)
½ day to 1 day	-	1 (33%)	2 (67%)	3 (16%)
From 1 to 2 days	-	1 (33%)	1 (33%)	2 (11%)
N/A[1]	1 (8%)	1 (33%)	-	2 (11%)
Duration of practice				
½ day to 1 day	9 (69%)	1 (33%)	-	10 (53%)
> 2 days	2 (15%)	-	-	2 (11%)
I[2]	1 (8%)	1 (33%)	3 (100%)	5 (26%)
N/A	1 (8%)	1 (33%)	-	2 (11%)
Location				
Classroom	1 (8%)	1 (33%)	3 (100%)	5 (26%)
Classroom and simulated environment	2 (15%)	-	-	2 (11%)
Classroom and in the field	10 (77%)	2 (67%)	-	12 (63%)
Format				
A single session	7 (54%)	-	1 (33%)	8 (42%)
Several sessions	6 (46%)	3 (100%)	2 (67%)	11 (58%)
Group size				
Theory				
1 to 5 participants	4 (31%)	1 (33%)	-	5 (26%)
6 to 10 participants	5 (38%)	1 (33%)	2 (67%)	8 (42%)
> 10 participants	4 (31%)	-	1 (33%)	5 (26%)
I	-	1 (33%)	-	1 (5%)
Practice				
1 to 5 participants	6 (46%)	1 (33%)	-	7 (37%)
6 to 10 participants	4 (31%)	1 (33%)	-	5 (26%)
> 10 participants	2 (15%)	-	-	2 (11%)
I	1 (8%)	1 (33%)	3 (100%)	5 (26%)
Proactivity of learners	12 (92%)	3 (100%)	3 (100%)	18 (95%)
I	1 (8%)	-	-	1 (5%)

[1] Not available; [2] Inapplicable.

Three quarters of the mandates obtained by the TPs explicitly refer to training activities for people in organizations (Table 5.12). The mandates of MSD prevention and/or the transformation of work

situations are barely mentioned. Two thirds of TPs (63%) say that they can move this initial mandate in a direction that they consider more adapted to the organization's situation (e.g., contextualized rather than turnkey training).

Table 5.12.   Mandates, objectives and perception of training programs (n=19)

Objective	Training			Total (n = 19)
	Worker (n = 13)	Trainer (n = 3)	Other (n = 3)	
Mandate[2,4]				
Training	9	2	3	14 (74%)
MSD prevention	4	1	-	5 (26%)
Training and transformations	1	-	-	1 (5%)
Evolution of mandate[1]	9	3	-	12 (63%)
Familiarity with the organization[2]	10	2	2	14 (74%)
Objective[2,4]				
Improvement of knowledge/awareness	12	3	3	18 (95%)
Skills improvement/transfer to work activity	6	3	1	10 (53%)
Behaviour change	2	2	-	4 (21%)
Discussions/problem solving	3	2	-	5 (26%)
Motor engagement	3	-	2	5 (26%)
Transformations	2	2	-	4 (21%)
Other	3	3	-	6 (32%)
Objective reached[2]				
Yes	9	1	2	12 (63%)
Mixed results	2	2	1	5 (26%)
N/D[3]	2	-	-	2 (11%)
Perception of training[2]				
Positive perception				
Participants	10	3	2	15 (79%)
I[3]	3	-	1	4 (21%)
Organization	9	3	1	13 (68%)
I	4	-	2	6 (32%)
Parallel activity to training				
Preliminary analyses	11	3	-	14 (74%)
I	-	-	3	3 (16%)
Follow-up	8	3	3	14 (74%)
Transformations made	3	-	-	3 (16%)
I	-	-	3	3 (16%)
Follow-up committee/working group	6	1	-	7 (37%)
I	-	-	3	3 (16%)

1: TPs were able to move the initial mandate forward; 2: As reported by the TPs; 3: N/D: not defined, I: inapplicable; 4: not mutually exclusive.

Three quarters of TPs say that they know or are familiar with the organization in which they operate. With respect to their mandates, the main objective TPs set for themselves (95%) is to improve learners' knowledge and/or raise their awareness, and, to a lesser extent (53%), to improve their skills so that they can transfer what they have learned to the workplace. Other more marginal objectives are reported: one in five TPs report that their objective is to transform work situations. With the exception of two cases for which we have no information, all the TPs said that they had achieved their training objectives, either fully (12/19) or partially (5/19).

The TPs' perception is that a large majority of training participants and their organizations have a positive opinion of the new training approach. With respect to activities carried out alongside the training, three-quarters of TPs performed preliminary analyses in order to prepare their training and did post-training follow-ups: it should be noted that these follow-ups generally consisted of a summary assessment of the stakeholders' opinion of training. None of them mentioned having evaluated other impacts of training, for example, in terms of behavioural changes, accident statistic analyses or return on investment (cost-benefit analysis). Some set up working or follow-up groups (37%), while barely 16% were able to realize transformations. However, they reported often leaving/providing a document with recommendations to that effect.

5.3.2 General Organization of Training and Mention of Action Principles

The 16 training programs analyzed (complete monitoring) represented a total duration of 62 hours and 40 minutes, of which 75% (46 hours, 54 minutes) concentrated on the theoretical part and 25% (15 hours, 46 minutes) on the practical part (Table 5.13). The main task, which represents more than a third of training time (36%) and half of the theoretical portion, is devoted to explaining the concepts (e.g., action principles, MSD risk factors and injury mechanisms, anatomical concepts). Two other activities each represent around 20% of training time and are both associated with some form of action by the participants. The first is group facilitation, in the theoretical part, where trainees are asked to perform various analyses (e.g., analysis of video clips, photos: 11 hours, 59 minutes or 19%). The second activity is concrete motor engagement of the participants in the practical portion, where handling tasks are performed (11 hours, 30 minutes or 18%). This latter activity is the most time consuming in the practice part (73%): discussions or problem-solving activities sometimes accompany this motor practice activity, but we did not make that distinction. All the other activities each take up less than 5% of training time.

With respect to the action principles being brought up during training, we remark that they are frequently mentioned, with a total of 2112 occurrences. The ratio of reference to principles between the theoretical and practical parts is on the order of 3:1, as are the relative durations of these two parts: it could be argued that, given the passage of time, the principles are mentioned as frequently in theory as in practice. The alignment and lever arm principles are the most often mentioned. Following that, in similar proportions, the principles of use of the load, loading and use of the body are brought up. Note that these three principles, especially use of the load, are mentioned more often during the practical portion. Four principles, namely balance, control, transition and rhythm, are rarely mentioned compared to the others. The principles of alignment and balance are mentioned more often in the theory portion than in the practice portion, while the opposite is observed for use of the load and control.

Table 5.13.   Organization of training programs (n=16) according to the duration (time) of tasks covered

Training task	Theory		Practice		Total	
	Total	Mean [Standard deviation]	Total	Mean [Standard deviation]	Total	Mean [Standard deviation]
Explanation of concepts	22:43	1:30 [± 1:33]	0:09	0 [± 0:02]	22:52 (36%)	1:25 [± 1:33]
Group facilitation/analysis	11:59	0:44 [± 0:52]	I	I	11:59 (19%)	0:44 [± 0:52]
Practical application: motor	I[1]	I	11:30	1:09 [± 1:32]	11:30 (18%)	1:09 [± 1:32]
Practical application: analysis	I	I	2:24	0:14 [± 0:34]	2:24 (4%)	0:14 [± 0:34]
Introduction	3:05	0:12 [± 0:14]	0:20	0:02 [± 0:03]	3:25 (5%)	0:12 [± 0:14]
Open discussions	2:35	0:10 [± 0:20]	0:16	0:01 [± 0:02]	2:51 (5%)	0:10 [± 0:19]
Group facilitation/motor	2:30	0:10 [± 0:12]	I	I	2:30 (4%)	0:10 [± 0:12]
Problem solving	2:17	0:09 [± 0:19]	0:22	0:02 [± 0:02]	2:39 (4%)	0:09 [± 0:20]
Conclusion	1:18	0:05 [± 0:07]	0:24	0:02 [± 0:03]	1:42 (3%)	0:06 [± 0:07]
Debriefing	0:27	0:01 [± 0:03]	0:21	0:02 [± 0:04]	0:48 (1%)	0:03 [± 0:04]
Total	**46:54**	**2:55**	**15:46**	**0:59**	**62:40**	**3:55**

1: Inapplicable.

Table 5.14.   Mention of action principles for the theoretical and practical portions (n=16)

Action rule	Theory	Practice	Total
Alignment	407 (25%)	82 (17%)	489 (23%)
Lever arm	288 (18%)	77 (16%)	365 (17%)
Use of the load	171 (11%)	98 (20%)	269 (13%)
Loading	177 (11%)	75 (15%)	252 (12%)
Use of the body	174 (11%)	61 (12%)	235 (11%)
Balance	148 (9%)	20 (4%)	168 (8%)
Grip	79 (5%)	45 (9%)	124 (6%)
Transition	89 (5%)	18 (4%)	107 (5%)
Rhythm	86 (5%)	17 (3%)	103 (5%)
Total	**1619 (77%)**	**493 (23%)**	**2112**

5.3.3 Appropriation of the IPSMH by the TP

5.3.3.1 Appropriation Indicators

Overall, the means of the scores attributed to each case for each of the 10 indicators suggests a high IPSMH appropriation level by the TPs (Table 5.15).

Table 5.15.   IPSMH appropriation indicators for those training workers (n=10)

Indicator	Training cases of workers with complete follow-up										
	3	6	7	8	9	11	12	13	14	21	Av.
Content											
1. Action principles											
Theory	4	3	4	4	3	4	2	3	4	4	3.5
Practice	4	N/A	I	4	4	4	2	2	4	4	3.5
2. Actual work activity											
Theory	3	3	3	2	3	3	3	3	4	3	3
Practice	4	N/A	I	4	4	4	3	3	4	4	3.8
Means											
3. Participatory approach											
Theory	3	2	2	2	2	3	3	3	3	3	2.6
Practice	4	N/A	I	4	4	4	2	4	4	4	3.8
4. Adjustment of learning conditions											
Theory	3	2	2	3	4	4	2	4	3	3	3
Practice	4	N/A	I	2	2	2	2	2	4	2	2.5
Contextualization											
5. Material-Illustrations											
Theory	3	3	3	3	4	3	3	3	4	3	3.2
Practice	3	N/A	I	3	3	3	3	3	4	3	3.1
6. Preliminary analyses											
Theory	4	4	4	2	4	4	2	4	4	4	3.6
Practice	4	N/A	I	2	4	4	2	4	4	4	3.5
Retention											
7. Transformations	3	4	1	1	1	2	2	2	1	4	2.1
8. Parallel activities	4	4	4	2	3	4	2	2	4	2	3.1
Duration											
9. Total duration[1]	1	1	1	1	4	1	1	1	4	1	1.6
10. Practice proportion [1]	1	2	1	2	4	2	1	1	4	2	2
Classification											
Sum of ratings[2]	52	N/A	25	41	53	51	35	44	59	50	46
Category[3]	2	N/A	3	2	2	2	3	2	1	2	2

N/A: The practice portion was not observed for case 6; I: No practice portion, a score of "0" would be attributed to calculate the training classification. 1: Scale of 1 to 4; 2: Minimum sum: 10, Maximum sum: 64. 3: Appropriation category: 1=Exemplary; 2=Sufficient; 3=Poor.

Five out of ten indicators scored three or more, the accepted threshold for determining a sufficient level of appropriation. For content, the action principles indicator received a score of 3.5, because action principles are frequently mentioned (both in theory and in practice), a number of links have been made among them, and there are very few interpretation errors. For the actual activity indicator, a score of 3.8 was ascribed for the practical component because actual work is often mentioned and is at the heart of discussions between the TPs and learners. Contextualization also scores very high. For example, preliminary context analyses are frequent, are carried out in a variety of ways (e.g., interviews, observations), and make it possible to identify emblematic and/or risky situations that are addressed in training. The TPs use a variety of teaching materials to illustrate the work activity and mainly conduct practical simulations.

The two indicators related to the training methods score lower in either the theoretical or practical portions. For example, encouraging a participatory approach appears to be more difficult in the theoretical portion (2.6/4) than in the practical portion (3.8/4), with the latter score being the highest assigned. This means that, in theory, TPs are mainly "transmitters" of knowledge. The opposite trend can be seen in the organization of learning conditions, which take shape with more difficulty in the practical part (2.5/4) than in the theoretical part (3/4). For example, in the practical portion, TPs find it challenging to manage group size and to gain access to the real work situations that they must frequently reproduce.

Three indicators show a more problematic appropriation. For example, the ability to transform work situations at the same time training is taking place (2.1/4) is rare. While the TPs provide recommendations to the organization, they are not involved in the transformations. In addition, the relative duration of the practical versus the theoretical portion (2/4) is not equivalent or balanced toward to practice, as recommended in the IPSMH: instead, the opposite situation is observed, with theory being dominant. Finally, the total duration of training scores the lowest among all the indicators (1.6/4). For this last indicator, only two of the ten training programs analyzed received a score of 4, with the others getting the minimum score of 1. Almost all the training programs last less than half a day. This means that the most significant divergences observed in training, with respect to the recommendations issued during the training of trainers, are found in the duration indicator: in a nutshell, training programs are too short and too theoretical.

Besides case 6, for which the classification could not be established because of a lack of data for some indicators, two cases were deemed to have a poor level of appropriation (cases 7 and 12: overall scores of 25 and 35, respectively). The indicator related to transformations, but especially the two associated with duration, contributed the most to the low score. For case 7, the absence of a practical portion was detrimental. In fact, only one case was considered to have an exemplary level of appropriation (case 14: score of 59), despite a low score for the transformation indicator. The other six cases showed sufficient levels of IPSMH appropriation. To this end, it should be noted that cases 3, 9, 11 and 21 were at the borderline of the category attesting to exemplary appropriation: the improvement of a single indicator would have tipped them into that category. As well, for three of these cases, a longer training period would have made them exemplary cases in IPSMH use.

5.3.3.2 The Determinants of Appropriation

The analytical framework of this study has two central variables: the indicators and determinants of appropriation. The first, covered in the previous subsection, reflects the IPSMH transfer level by TPs. The determinants are factors that explain the challenges posed by this transfer: they are the subject of this subsection. First, the principal determinants that influenced the implementation of the IPSMH (both drivers and obstacles) will be presented. Then, to complete these results, the main advantages and challenges posed by the IPSMH will be discussed.

Table 5.16 shows the relationship that the influence of certain determinants may have on the appropriation indicators discussed previously. At the outset, it can be noted that many factors have influenced TPs in their efforts to use the IPSMH. The determinants related to organizations requesting training services (with reference to primary environments), are those that have the most impact on TPs in their IPSMH use strategies, and the possible trade-offs they may have to make. In this instance, the determinant with the most positive impact is openness and support from this environment. While TPs seem to have the freedom to define content, the same cannot be said of the possibilities they have in implementing the educational method and contextualizing the knowledge covered in training. They depend, for example, on the support offered by internal actors or on the accessibility of workstations, especially in the usual context of production, which must not be disrupted:

> *At any time, when I needed information about handling situations, even if the preventionist did not always know the answer or the reason, she would check with those involved (supervisor or members of team X) and come back with the response.*

> [...] *It's impossible to interrupt production; space is very tight, but a worker took the lead. They reproduced typical handling situations in the backyard.*

> [For the practical part] *we had the option of being indoors or outdoors depending on the orders going out, because it's hard to plan in advance what kind of orders they'll get at this kind of plant. For them, the orders come in, so okay, this many units, that day.*

The question of budgets allocated for training is one of the determinants most often reported by the TPs and is the one identified as being the main constraint on their actions: costs will have an impact on several levels, both in terms of the number of times and the periods (time and duration) when learners can be released from work, as well as the extent and/or the number of transformations envisaged. While their own remuneration is mentioned, it does not appear to be a significant determinant in comparison with other costs:

> […] *I have the impression that for employers, it'll be more related to the fees […] that they'll say, "Yeah, okay, well, it's gonna cost a lot in professional fees". But really, you know, the professional fees, they're nothing compared to the salaries of the employees who have to be freed up […] Yeah, even the financial argument, because, you know, we trained, say, 400 workers, but 400 workers times two hours, you're already up to 800 hours. So 800 hours times, I don't know, 20 bucks an hour… that would be maybe $16,000.*

Table 5.16.   Appropriation determinants and their influence on the appropriation indicators and the overall implementation of the IPSMH

Indicators	Appropriation determinants			
	Organization where training took place	TPs' employer	Trainer-practitioner	Tasks and learners
Content		Presentation of the AWA: assignment of the TPs according to their expertise; Partial imposition of content.	Familiarity with the content; AWA integration: familiarity with WA.	
Means	Establishment of learning conditions: costs/budget, support of internal actors, access to workstations and workers, facilities available; Approach: absence of PPE.	Access to computer equipment; Catalogue of turnkey training programs.	Familiarity with the approach; Approach: TPs' profile; Familiarity with the workers.	Approach: age and participants' experience, language barrier.
Contextualization	Access to workstations and workers; Preliminary analyses: margins of manœuvre (time, access, etc.), support from internal actors; Material: access to production activities.	Material: assignment of TPs according to their expertise; Preliminary analyses: workload, access to the organization's data, margins of manœuvre (duration, approach, etc.).	Familiarity with WA.	Contextual difficulties.
Retention	Costs/budget; OHS maturity; Possibilities of limited transformation.	Workload; SHPE		
Duration	Costs/budget.	Margin of manœuvre; Catalogue of turnkey training programs; Workload.		
Implementation of the IPSMH	OHS maturity; Margin of manœuvre; Budgets; High accident rate; Recommendation from an external firm or the CNESST; Legal obligation.	Margin of manœuvre; TP fees paid by employer; Workload; Openness to the approach/support.	Familiarity with the organization and approach; sense of self-efficacy level; Exchanges with co-workers.	Handling is the central WA.

AWA: actual work activity; WA: work activity; SHPE: specific health program for the establishment; PPE: personal protective equipment
Organization where training took place = primary environment; TP employer = secondary environment.

The factors that led to the training request should be considered, whether it is a high accident rate, a legal obligation or the fact that the TP was recommended by a third party. Finally, the level of OHS maturity of the organization perceived by the TPs, and their "openness" to the approach also play a role, especially with respect to the margin of manoeuvre given to the TP to carry out the intervention:

> *For union-related reasons, I was unable to film all of the workers, and wasn't even allowed to film for the more practical portion.*

> *I had no problem getting information or access to the environment. I spent several hours without the employer being with me (latitude to talk with the workers on my own).*

> […] *They really said like "manage it the way you want" and then they left us… carte blanche because we had suggested some plans. And they were really open to that, because I think they'd understood the importance in the long-term as well.*

A second series of determinants relates to the TPs' employer, or the primary environment. Although the list of determinants is long, the flexibility they have, and their workload or the lack of resources (mainly human), are the two main factors reported. The support offered to TPs, in this case, that of co-workers, is perceived as facilitating the use of the IPSMH:

> *Then you know, to be honest, sometimes there are logistic issues depending on our schedules, our constraints, all of that, it's not… There are times, in some situations, when it's unfortunately not possible to get there… Like there, for example,* […] *It's not possible to meet a few days before with half a day of preparation.*

> *I think we have a big advantage in public health to be able to take the time necessary per case, for sure, we're still limited* […] *So I see this as an advantage because we have a bit more time than those who are in the private sector, I think, because they have to charge either a flat rate or by the hour.* […] *because we could go and do an analysis, more in-depth beforehand, I think, we could afford to do it.*

> *Barriers? Of course there will always be some. The aspect… I have to* […] *allocate services to all of the organizations we serve. So spending lots of time with one organization and basically reducing the time available for the other organizations, well there… With* [my employer]*, it's not so good. He'd like me to do as many interventions as possible. But from a training perspective like that, which still requires a lot of time, it may not be so easy to do that.*

The determinants associated with TPs could be summarized as familiarity issues, either with the IPSMH, which is correlated with a sense of self-efficacy, with the requesting environment or with the handling activity that is the subject of the training (or with handling itself). A greater degree of familiarity with any of these aspects facilitates the use of the IPSMH:

> *I found it difficult to plan and orchestrate the practical part. Because of the unknown aspect in my case, I would've liked to have had more tools to get the participants on board. To have guidelines if you have this type of practice with this many participants, you must take this much time, etc.*

> *[…] the choice of project manager beforehand also ensures that the choices of schedules, then the organization of the schedule, can be done according to the practitioners' experiences. You know he (the project manager) knows that I've trained a lot of blue collars, you know he knows that I'm very familiar with* [the work activity].

> *No because my co-workers don't have a basic knowledge of ergonomics. They don't have the same background as me. It's more about health and safety, so of course in terms of knowledge, they are less comfortable if they get asked questions. All that, they don't know too much about it. So, how to respond or how to assess a situation as well. That's kind of what's blocking them, I don't think there's any bad will. But I think that it's still … It takes knowledge and I'm the only ergonomist […] But sometimes, you still have to improvise. So it's that… not everyone that can handle it. There are some who need more structure in their training. So it's that, it depends on the personality, but it also depends a lot, a lot on knowledge.*

The determinants related to handling tasks or learners do not appear to have a significant influence on the dynamics of the IPSMH. The factors considered as the most important by the TPs concern first and foremost the primary and secondary environments: the contextual or organizational elements appear to be more significant to them. The impact of the complexity of handling tasks is an underestimated determinant.

In addition to these results, the benefits and challenges of using the IPSMH are presented in Table 5.17. Overall, the IPSMH is an approach that enhances the value of the work of handlers. Moreover, it is in harmony with their work activity, so that they will see themselves more in the content covered. Indeed, the great strength of the IPSMH (attributed mainly to the use of the action principles) is to provide training content in line with the realities of the context. We also see advantages in the IPSMH's role as a mediator of learning, which makes it possible to create a participatory approach in which all the learners feel involved. Adapting learning conditions to the realities of the contexts is also a strength. Although sometimes difficult to implement, there is a definite interest in contextualizing or establishing practical learning conditions that are most in line with real-life situations and production. Although the complexity of the IPSMH and some action principles are mentioned as problematic, the challenges lie mainly in the negotiation of the mandate: it contrasts with those of more traditional training programs with which they are normally involved. The primary challenge lies in arguing for longer training durations: the time allocated is insufficient and it is difficult to obtain more. Negotiating for transformations is also reported as being difficult by the TPs.

Table 5.17.   Use of the IPSMH: advantages and challenges

	Advantage	**Challenge or difficulty**
General approach	Recognition of the work of handlers; Transfer to the AWA.	Negotiation of mandate; Training program preparation time; More complex approach than traditional training.
Appropriation Indicator		
Content	Action principles: analyses and observations (know-how), applicable to various contexts, use of a common language; Update handling knowledge.	More difficult action principles: body balance, transition, rhythmic movement; Good understanding of the AWA and link it with the principles; AWA and difficulties experienced by the participants: the organizations' and TPs' fears of over-emphasizing certain problems.
Means	Mediator role: encourage the participation/collaboration of workers; Organization of learning conditions: practice at the workstations/contextualization.	Participatory approach: mediator role, participation of everyone. Organization of learning conditions: practice in actual situation; group size (negotiation), analysis of operating methods *in situ*, access to appropriate environments (e.g., workshop room).
Contextualization	Contextualization of the training.	Preliminary analyses: negotiation of time necessary.
Retention	Open the door to transformations.	Follow up: methods and organization of follow up; Transformations: negotiations.
Duration	-	Duration or allotted time: often too short.

AWA: actual work activity.

5.3.3.3 Detailed Description of Three Distinct IPSMH Appropriation Levels

In the two previous subsections on appropriation indicators and determinants, the cases were addressed as a whole, without the reader being able to fully assess the training approaches specific to each of them. Above all, it is difficult to make connections and thus explain the determinants that could potentially lead to a low score for one or more appropriation indicators, for a specific case. For example, a low score could be assigned to a TP for the "preliminary analyses" indicator, which consists of collecting data on handling situations in order to contextualize learning. However, the absence or weakness of a preliminary analysis phase could be explained by the TP having too much work and not enough time to conduct the analyses.

It is impossible within the scope of this report to detail the specificities of each case. However, details for three contrasting cases of IPSMH appropriation will be presented, namely an exemplary case of appropriation (case 14), a case of sufficient appropriation (case 21) and a final case in which IPSMH appropriation is considered poor (case 7). This way, the reader will be able to better understand the main determinants that have contributed to these different levels of appropriation. In addition, for illustrative purposes, all the data from case 14 are detailed in Appendix 12; these data have been used to characterize it, and therefore allow us to tell its "story."

a. The Case of Exemplary IPSMH Appropriation: Case 14

Figure 5.1 shows the scores assigned to the various appropriation indicators for this case (centre of the figure). These are obviously the same scores as those presented earlier in Table 5.15, but in visual form. In addition to the one for transformations, which was rated at the lowest level, all the other indicators are above three and several scored four, the maximum score: this case has a cumulative score of 59, out of a total possibility of 64 points. It is therefore considered exemplary.

The four main categories of appropriation determinants used in this study appear around the outside of the figure. Here, the TP associated with this case is a staff member of the organization in which training took place: that is why the primary and secondary environments are the same at the top of the diagram. The TP reports that he benefited from several facilitating appropriation determinants in relation to his context: he says that he is supported in his actions by co-workers and supervisors, he has considerable leeway in decision-making as a trainer, and the internal OHS culture in his environment is moving in the right direction. In this regard, he was able to mobilize the internal health and safety committee to support him and legitimize his actions. This TP works at the job of handling for which he now trains new employees. He combines the two tasks, because, when necessary, he is released from his job as an order picker to provide training. With 11 years of experience in the company, he is thus very familiar both with the working environment and the handling tasks of the order pickers he supervises. The handling tasks are not felt to be too difficult/complex, with the variability of loads being the main challenge. After receiving the IPSMH train-the-trainer training, this TP reported having a sense of self-efficacy higher than 8 on a scale of 10, although he reported being relatively unfamiliar with the IPSMH (3/10) before receiving the training.

However, he has to deal with the fact that production cannot be affected by the training activities for which he is responsible. He partially succeeds in this by gradually integrating new employees into production while training them (on-the-job training). It is also possible to adapt the level of difficulty of the tasks, in particular, by working with the production requirements (quotas). This allows him to spread the training over time and gradually increase the level of difficulty: he thus gradually helps them to become more autonomous. Moreover, the TP-learner ratio is excellent (1:2).

Appropriation Determinants

Employer - Organization
Logistics - L

Facilitators:
- Support/involvement of internal actors
- Openness to/progress in the culture of prevention in OHS
- Margin of manœuvre

Constraints:
- Costs (production demands)

Appropriation Indicators

Theoretical portion

Practical portion

■ Content
■ Means
■ Contextualization

■ **Duration**   ■ **Retention**

Operator-trainer
Seniority: 11 years
Familiarity with the IPSMH: 3/10
Sense of self-efficacy 8.4/10

- Familiarity with the work activity

Tasks: preparing orders
Manual handling : central
Trainees: novices

Difficulty related to context: 2/4
Loads: diverse
Environment: closed

Trainer-practitioner (TP)   **Tasks and trainees**

Figure 5.1. A case of exemplary IPSMH appropriation (case 14).

His constant presence in the workplace ensures good contact with novice handlers (whom he gradually gets to know, as they are his co-workers), and he can then give regular feedback. He is able to observe their progress and adjust his teaching accordingly. He also monitors them closely, even using video from learners in action to coach them on elements he considers problematic. The theory he seeks to transmit is always in line with the practice he observes. Learners therefore spend a lot of time putting what they are taught into practice. They have a high level of motor engagement and receive feedback that enables them to adjust and to progress. This training approach is exactly what is recommended in the IPSMH, with the exception that no parallel action is being taken to transform certain working conditions that are more restrictive for

order pickers. It can be seen that several appropriation determinants facilitate the training approaches established in this workplace, while the restrictions are rather low and manageable.

b. A Case of Sufficient IPSMH Appropriation: Case 21

This second case illustrates sufficient appropriation of the IPSMH. The training program obtained a cumulative score of 50 in terms of appropriation indicators. With case 6, these are the only two training programs to have obtained a maximum rating of 4 for the transformation indicator (Figure 5.2). This can be considered an actual "training intervention" for which certain working conditions considered restrictive were modified through an intervention initially focused on training.
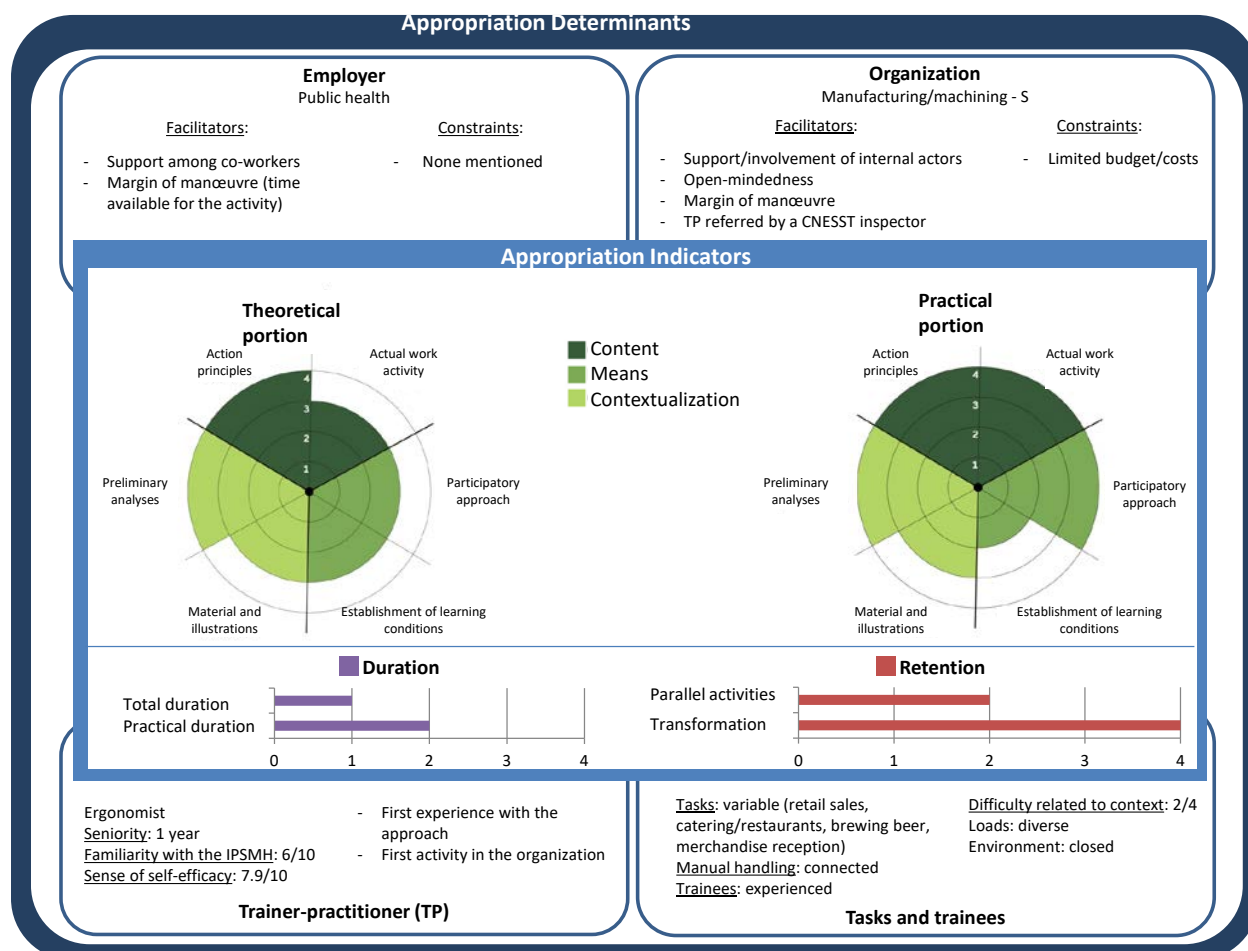
Figure 5.2. A case of sufficient IPSMH appropriation (case 21).

Three indicators scored lower, two of which were related to duration. The organization of learning conditions during practice was also a more difficult element for the trainer to manage. This aspect will be discussed further below. The trainer is a new workplace public health worker, with barely a year of seniority, who worked in a small company in the manufacturing and machining sector. A variety of handling tasks are performed, sometimes involving moving heavy loads (barrels, grain bags). These activities are related to the primary tasks of the employees, who are experienced workers. The group of learners was quite mixed, including receptionists, brewers, stock-keepers, etc. Their tasks and roles within the organization are varied. However, the handling activities concerned are not very difficult in terms of variability. This is the trainer's first experience using the IPSMH, which he said he knew quite well before being trained and for which he has a fairly high sense of self-efficacy.

In this context, the TP reports several positive appropriation determinants for the implementation of the IPSMH. His employer gives him the time he needs to carry out this intervention and the competitive spirit among co-workers is stimulating. Moreover, the requesting organization provides adequate support and sufficient flexibility to perform preliminary analyses. It is also open to recommendations resulting from his intervention. His training is in continuity with the involvement of the CNESST inspector who referred him: this was a supportive situation and not an action aimed at pressuring the employer. The limited budget allocated to the intervention was the only restrictive factor reported by the TP: it is a new cooperative with limited resources at present. There is also a problem with the use of personal protective equipment (PPE): some learners did not have safety shoes, which, for some, interfered with the possibility of handling loads.

The single training session (one hour of theory and another hour of practice) focused on problem-solving and brainstorming activities with a group of six learners. The TP had previously identified tasks (n=6) that were both emblematic and problematic and proposed them to participants. The practical portion took place at the workstations, but without the pressure of production requirements. The same two people (who had their PPE) handled the loads while the others were asked to comment on their co-workers' ways of doing things based on the action principles studied in the theoretical portion. These exchanges made it possible to determine restrictive working conditions at more than one workstation and led to concrete transformations of physical facilities, the purchase of equipment and the review of certain work procedures. The TP mentioned that a follow-up has been planned. With the exception of the limited duration of training, this case is representative of the training philosophy underlying IPSMH and the mechanisms of action that characterize it.

c. A case of poor appropriation of the IPSMH: case 7

This last case is interesting insofar as it corresponds to a commendable attempt by a practitioner to use the content characteristic of the IPSMH and to adapt it to a pedagogical model mainly focused on the transmission of theoretical knowledge. As a result, this training program was given excellent scores for content as well as for the efforts to contextualize the material presented. However the elements of the method used were not in line with the basic philosophy of the IPSMH, which focuses on the concrete application of knowledge acquired through interactions with the context. This was followed by low scores for the participatory approach and the development of learning conditions for the theoretical component. Moreover, this rather brief training program had no practical portion. Therefore, there was no motor engagement and no transformation action

was suggested. In the end, the intervention obtained the lowest cumulative score of all the cases, with a total of 25 points, because the absence of a practical component was very detrimental.
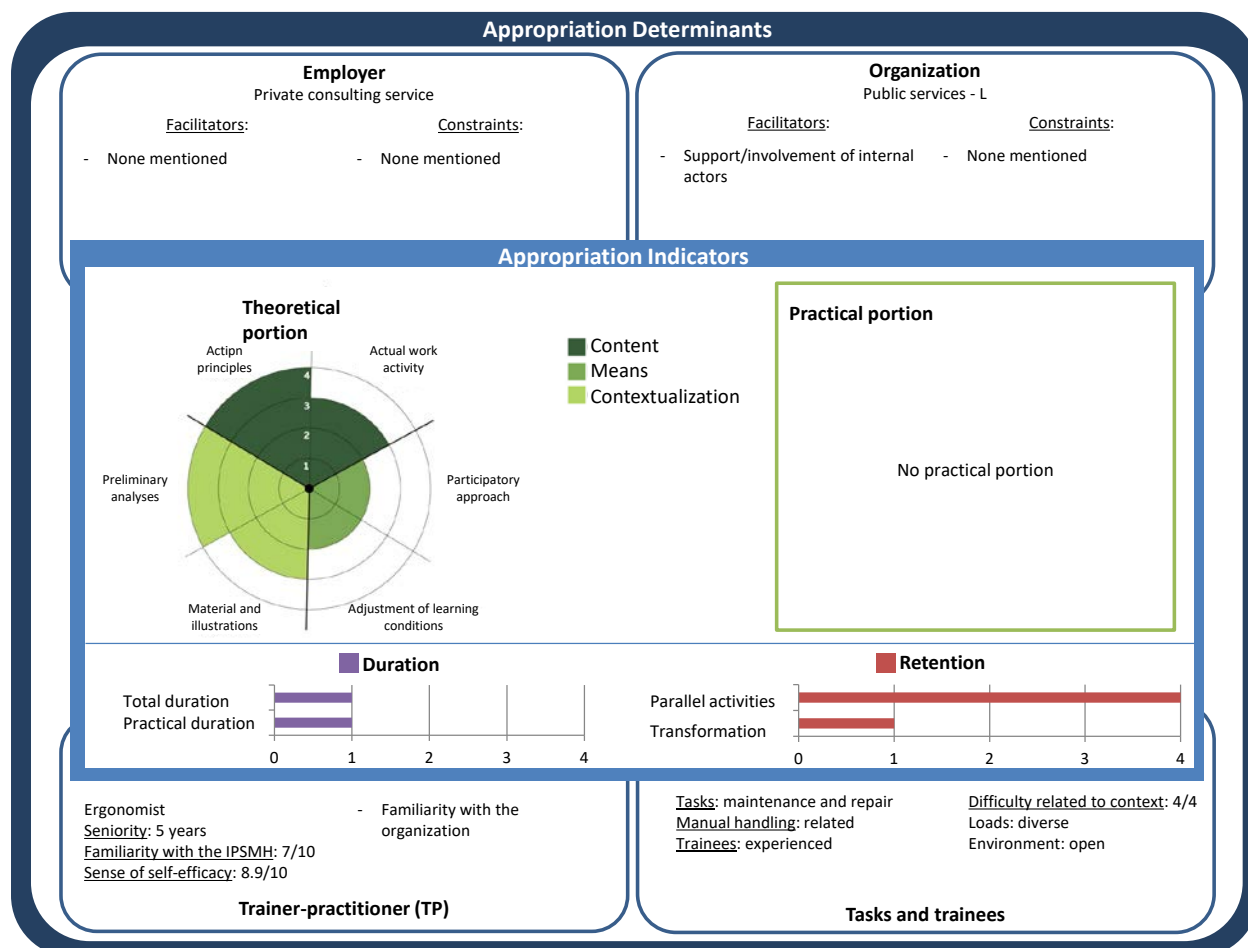
Figure 5.3. A case of poor IPSMH appropriation (case 7).

The reader should keep in mind that the judgment about this training is not absolute, but related to a frame of reference that constitutes the IPSMH. In this sense, and although this training may have merits, the results show that in a number of ways, it is not in line with the IPSMH. Here, the TP has developed training content largely inspired by the IPSMH and the action principles. In addition, he made an effort to contextualize the concepts presented by adding practical examples from the learners' workplace through a preliminary analysis phase. However, the learners did not have the opportunity to apply their new knowledge, since no pedagogical activity involving motor practice was included.

The analysis of the appropriation determinants suggests that this choice of training model was not restrictive or imposed, because the TP does not report any particular difficulties in its application. In this case, this TP was familiar with the organization and with the IPSMH and reported a high sense of self-efficacy with respect to its implementation. However, it should be stressed that the handling task here is considered complex due to its variability, a constraint that should not be overlooked. The TP had the mandate to train several dozen workers, which may have had an influence on the pedagogical choices made.

This TP works for a private company whose handling training program has two complementary and progressive components. The first component, which corresponds to the training activity observed here, is intended to be an introduction to accident and injury prevention in handling, a first step leading to more in-depth interventions. The research team was able to observe the second component, but the intervention was not conducted by a trainer[7] who had participated in the train-the-trainer program, and therefore, was not included in our sample. However, the second component, in addition to the first, has all the characteristics of the IPSMH, which was not the case of the first component, taken in isolation.

5.3.4 Analysis of the Theoretical Portions of Worker Training (n=6)

The analysis of the theoretical portions of the six worker training sessions made it possible to assess the use made of the action principles by the TPs. The principles were not originally designed to teach handlers, but rather, to act as a useful guide for TPs to understand, beyond the strictly postural aspects, the complexity, in terms of motor skills, of the handling techniques used in real work situations (see the insert on page 25). The research team therefore wanted to better understand the more theoretical use made of them by TPs and their insistence, during training of the trainers, on teaching them before the practical portion.

In general, two main ways of using the principles were highlighted in this context. On the one hand, the TPs mention them, one by one (sometimes in pairs), by associating each principle with one or more handling risks. For example, the reference to the alignment principle will enable the TPs to talk about the risks associated with awkward positions, such as forward and lateral flexion or twisting and rotation. This provides the opportunity to discuss anatomical concepts, to talk about intervertebral discs and some of the ways that injuries result from "bad posture" (e.g., shear or compression forces, torque). The key idea seems to be to raise the learners' awareness of the principal risks involved in handling, in addition to introducing them to the terminology the TPs will use when needed in the practical portion. Although more data on this association between principles and risks are available, they will not be presented in this report. Note that some of the principles are more popular, while others (such as transition (n=10) and rhythm (n=18) principles) are seldom taught (Figure 5.4). However, both could be an excellent way to talk about some of the more underrated risks of handling.

On the other hand, and although the action principles can be brought up one at a time, the results show that in more than half of the references (57%), the TPs combined them in such a way as to mention the diversity of techniques used to handle a load. This use of the principles is more in line with what was planned during the development of the IPSMH: to describe handling techniques in their complexity, in order to understand their advantages and disadvantages. The simultaneous association of two principles remains the most common, with alignment being most often related to the other principles (Figure 5.4: number that links the two principles). Alignment alone represents a quarter of all the references compiled during the theoretical portion of training programs (n=128). The most popular pairs are those for which alignment is combined with *(a)* lever arm (n=24), *(b)* use of the body (n=30), as can be seen in the following extracts from the full verbatim transcript:

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[7] This practitioner was very familiar with the IPSMH because he had participated from the outset of its development as a consultant. He instead delegated one of his employees to take the trainer training.

a. *Here, what we saw was when he pulled the load, <u>he tilted it to bring it closer to him</u>, to <u>get it better aligned</u>, at the same time, <u>also reducing the lever arm</u>, like I'll talk about a bit later. So, look at what he's doing. Is it right?*

b. *Here, see, what technique is he using? He's first using the <u>weight transfer technique</u>, then the body technique. I don't know if you saw it, but he rested it <u>on his thigh</u>, and then he lifted it. He didn't <u>stretch out with his back</u>, so the effort is much less.*
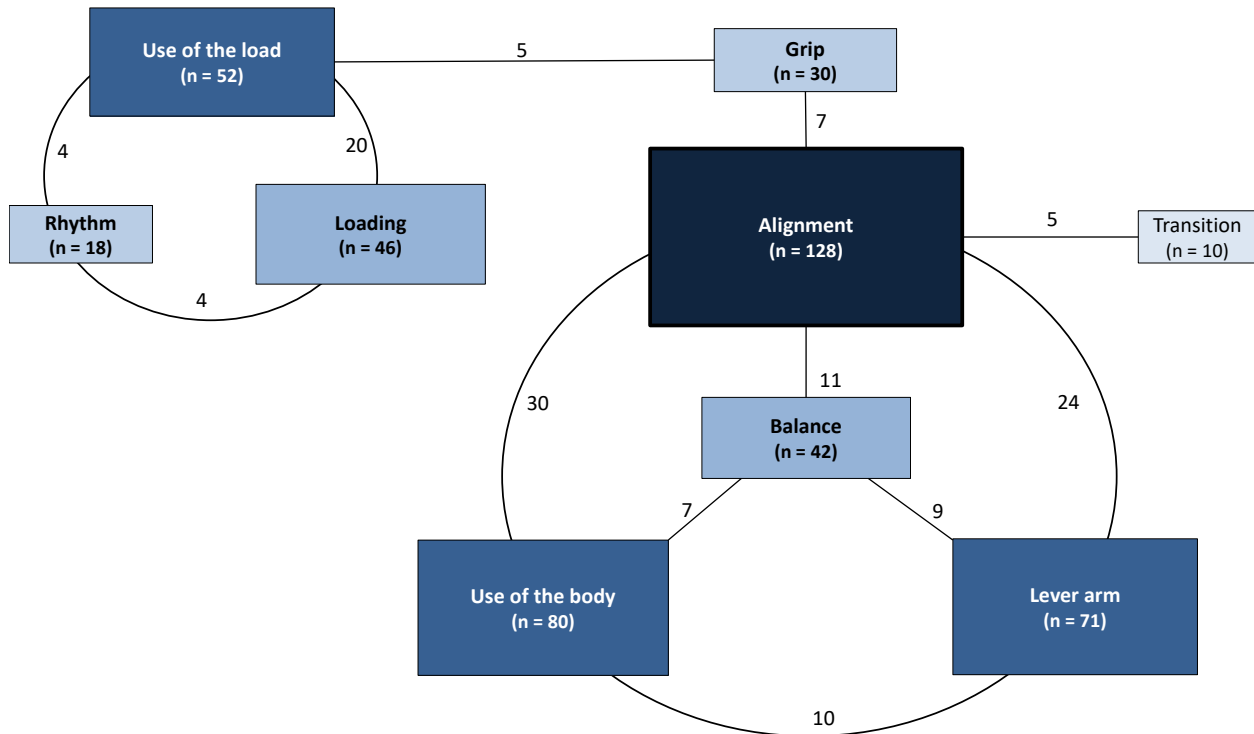
Figure 5.4. Individual and simultaneous mentions of action principles during the theoretical portion of workers' training programs (n=6).

The combination of more than two principles to describe a handling technique, although less frequent, was also highlighted. Thus, two clusters, or sets, of rules could be identified. The primary combination, mentioned nine times, is the one in which the use of the body, alignment and lever arm are associated simultaneously. These three principles alone represent more than half (n=279 or 58%) of the recorded statements. The association of these three principles suggests a reference to the traditional safe technique as suggested in the following extract:

> *F: In French, some people call it the "technique du 4" (4-part technique) because there are four parts to it, and others call it the safe technique. There are lots of names in French anyway. It's something you've likely heard of. What are the basics of this technique? When you lift a load, what are the key principles?*
>
>> *P: Bend your knees;*
>> *T: Bend your knees, use your legs;*
>> *P: Keep your back straight;*

T: Keep your back straight. Anything else? Keep the load close to your body.

Being in a stable position (the balance rule) is sometimes added to these four to describe a technique more comprehensively, or to provide some nuance, as in the following extracts:

> *Here, the person is <u>really bent forward</u>. Of course, if he had picked up a load here, he would have been less bent over, <u>except that he wouldn't be stable</u>, he would have been off-balance. So he would have had to get it from farther away.*
>
> *So you've probably heard of the correct approach to lifting. Before, what did they say when you were being trained in handling? <u>It was take a wide stance to be better balanced, use your legs, not your back, move the box closer to your body</u>, and when you have to put something down on a table beside you, <u>pivot with your arms</u>, because <u>you don't want to twist your back.</u> Have you ever heard that before?*

Finally, another cluster is formed around the use of the load, which is associated with loading (or the duration the load must be held), but also with the principle of rhythm of the movement. After the reference to the safe technique, this set of rules is the most frequent:

So he's going to <u>use the load</u>, he <u>won't work against gravity</u>. He pulls, but strategically to find the pivot point, and after that, he'll move the load with his co-worker towards where it is to be put down, without straining too much. He <u>also decreases the transportation time,</u> when he's actually carrying the load. You can see that he'll really <u>move with the load</u>.

Use the weight of the load. So we also talked about a crate that is high up, you'll bring it down, you know when, <u>the momentum, when you do it… it goes down by itself</u>, you put it down, OK? <u>You don't stop in the middle</u>, if it goes down, you try to <u>let it go. Let the crate go as soon as possible</u>, it's really important OK?

These results clearly show that the TPs attempt to describe and explain handling techniques by calling up several principles simultaneously. At the same time, considerable concern is noted for postural aspects, with the principles of alignment and the lever arm being frequently used and combined to provide feedback to learners, and in particular, to alert them to the risks they face.

Summary of <u>component 3</u>: key ideas to keep in mind

- The training programs using the IPSMH have mainly taken place in the traditional manufacturing sectors, but they are also offered in the service sector. Various organizations/companies, handling tasks and learner groups from a variety of backgrounds have been involved, which reflects the versatility of the IPSMH;

- For 18 of the 19 cases covered, the TPs set themselves the objective of improving the knowledge of trained workers, while one out of two TPs mentions the improvement of skills and their transfer to the workplace. Fostering motor engagement and transforming work situations are rather marginal objectives that concern only about a quarter of all training courses; this despite the fact that they are among the most distinctive objectives in the philosophy and action mechanisms behind the IPSMH;

- The training durations remain short and the same as those found in the self-reported data in the survey from component 1, although more time was allocated for the complementary activities such as preliminary analyses or follow-up periods: it is the interaction time between the TP and learners that remains more or less the same, or usually less than a half-day. Negotiating for more time is reported as being difficult;

- This interaction between TPs and learners is dominated by the theoretical portion, three times longer on average than the practical component. The action principles structure the contents of both parts. The TPs simultaneously mention the principles for describing and commenting on handling techniques, a high expectation of the IPSMH;

- The scores attributed to the various appropriation indicators are also high in general: the appropriation level in two cases was deemed to be poor. The lowest scores concern the pedagogical aspect, the transformation actions and, above all, the duration. The data suggest that the logic of the IPSMH is broadly respected, but that some discrepancies persist;

- These discrepancies can be explained by various determinants, which constitute barriers/deterrents to appropriation and which force the TPs to adjust to the situation. However, these regulations are sometimes complicated to implement and are not all under the full control of the TPs, given their professional situation and status. This is reflected in the three indicators that were rated lowest: means, transformations and duration;

- The three cases presented, which are characterized by contrasting levels of appropriation, show precisely how these determinants play their roles and modulate the implementation of the IPSMH: it is easier to implement in some contexts than in others. Updating these constraints makes it possible to alert TPs and to prepare them accordingly;

- The practitioners use the action principles in accordance with the lessons they have learned, although some are mentioned more frequently and others are underused. A fairly strong "postural bias" exists

6. DISCUSSION

This discussion is divided into five sections. In the first section, the contexts in which the IPSMH was used by the TPs will be discussed. Results showed that it can be implemented in diverse work environments, for various groups and handling tasks (6.1). Particular attention will be paid to the fact that a training approach using the action principles has all the characteristics required to deal with this inherent variability in handling activities (Denis et al., 2011a). The second part will revisit the study's central objective by discussing the levels of IPSMH appropriation observed by the TPs (6.2). While the level of appropriation may be deemed to be very good, a process of "emergent" appropriation is noted. While certain indicators suggest a high level of appropriation and transfer, others question this and stress that there are still persistent divergences between the prescribed (recommended) IPSMH and that actually used. It appears to be more difficult for the TPs to apply certain of the IPSMH's recommendations given the margin of manoeuvre they have in carrying out their training program. Their power to influence certain appropriation determinants identified will modulate how they implement the IPSMH and the adjustments that they make.

The next section returns to the idea of "emergent" appropriation by identifying two major transitions that TPs must make to respect the IPSMH training philosophy (6.3). These transitional phases make it possible to link two training paradigms that will be briefly described. The fourth section insists on the fact that these obligatory transitions can destabilize TPs if they are not adequately supported, which could lead to disinterest in the IPSMH. The final section focuses on the limitations of this study and the research perspectives that it inspires for the future. Throughout this discussion, in the appropriate place, ten suggestions to improve the IPSMH and/or trainer training will be presented in inserts.

6.1   Variability and IPSMH Make a Good Couple: A Multifaceted Approach

This study demonstrates that the IPSMH can be used to train groups of handlers in a variety of production and handling contexts. It is also the primary concern of the action principles, which make it possible to provide training content specific to the contexts in which they will be used. Additionally, it is the main advantage that TPs see in using the IPSMH, namely, its ability to take into account the actual activities of handlers. Furthermore, the TPs report a positive response from workplaces with respect to this new approach to handling training: It is more in tune with organizational realities.

Although the IPSMH was developed to be offered to all types of workers who must move loads, the TPs were also able to reach other prevention actors. In this way, trainers employed by organizations (for instance, team leaders and supervisors), were introduced to the basics of the IPSMH so that they could then use it themselves. This potential clientele was mentioned during the training of trainers. The TPs see gains in terms of sustained injury and accident prevention as these organizations become more autonomous in training their own staff, because they are less dependent on external trainer-practitioners. But the training provided to specialized rehabilitation groups was the most surprising. Since then, interest in the action principles for use in the rehabilitation process of workers is gaining ground: it is a promising new opportunity for the IPSMH. Also, since the end of the monitoring period, some TPs have promoted the IPSMH in their own organizations, and train-the-trainer programs have been implemented to teach preventionists its appropriate use. While noteworthy, these initiatives must be monitored. In fact,

although the results of the study attest to a very high level of IPSMH appropriation by the TPs, they also show that appropriation challenges persist.

Suggested improvement #1

The various opportunities identified for the IPSMH should be promoted more in the training of trainers to encourage its broader dissemination, in order to maximize its potential. The TPs must, however, be prepared to adapt the IPSMH to other groups and contexts, in particular, for the rehabilitation of injured workers.

6.2   An Emergent Appropriation of the IPSMH: Between Getting Started and Mastering

With the exception of the TPs who had to withdraw from the study (n=8), only four of them did not provide training during the follow-up period. Sixteen TPs were able to experiment with the IPSMH, most for the first time. Despite diverse personal and professional characteristics, they were able to appropriate and transfer the IPSMH in their usual practices, although not without experiencing some difficulties. It remains that this innovative training approach, even though it has a certain degree of complexity, can be learned and used by most preventionists, as long as they are well prepared. Case 14 for example, one of those qualified as exemplary appropriation, is a training program that was provided by a worker with no basic OHS training. The post-training assessment of trainer-practitioners confirmed the qualities: usefulness of concepts learned, a sense of mastering them, intention to transfer the information, and a strong sense of self-efficacy. However, for most of the TPs, the research team witnessed their first concrete use of the IPSMH,[8] without any other form of practice. It is therefore realistic to posit that these training sessions may not be optimal and there is still room for improvement, which was also noted empirically among those who were seen more than once. Although a majority have embarked on the process, mastery of the IPSMH is not yet complete.

Suggested improvement #2

In addition to training the trainers, offering a follow-up and providing feedback after the first use of the IPSMH would probably encourage its appropriation even more and could be an additional incentive to its use, especially for those with a lower sense of self-efficacy in post-training and/or those who are less familiar with the approach or with handling per se. The last two variables interfered with use of the IPSMH.

In fact, this is what the study results suggested: a form of "emergent" appropriation. The following are some characteristic examples:

-   The principles are used and combined to describe the diversity of possible handling techniques, a distinguishing feature of the IPSMH. However, use of the principles more closely associated with the safe technique remains the most frequent: alignment, lever arm, and use of the large muscle masses of

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[8] This had been decided to ensure that as many cases as possible could be covered during the monitoring period.

the body. The postural concern is prominent and constitutes a strong point of reference;

- In contrast, other principles are underused: this is the case of transition, rhythm of movement and control of the load. Balance, a central principle, should be used more often because it constitutes, with transition, a specificity of movement required for handling loads, and it is an underestimated source of risk;

Suggested improvement #3

The principles used less often by the TPs are the most abstract: it is not as easy to describe them. The use of new information technologies, in particular, augmented reality and the use of animated avatars, could perhaps be considered to teach these principles. Sufficient time and emphasis on their importance has been devoted to these principles in training: the solution lies in how to make them more intelligible and tangible for TPs.

- Efforts to provide training at the workstations, in an actual context of production, were observed. However, this environment is often not adapted to the learners' level in terms of learning conditions: learners may be overwhelmed with information and/or distracted to early on by performance concerns that hinder learning;

- Although the practical component is usually present, on average, theory takes up three times more time: the most frequent educational activity remains the transmission of knowledge to workers who listen passively;

Suggested improvement #4

The emphasis in training TPs in use of the IPSMH has been on its specific content, in particular, the action principles, and have therefore taken up most of the training time, since they constitute its originality. The training method characteristic of the IPSMH (participatory and reflective approaches, motor engagement in adapted situations, identification of contextual constraints) should now take up a greater share of the TPs' training time. Following a rationale similar to that of the action principles, the pedagogical principles specific to the IPSMH's action mechanisms could be offered to TPs to help them create conditions more conducive to learning.

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- The idea of interaction between learners and their context is present and modulates how the TPs do things. In this perspective, they will sometimes make recommendations for change in the context, but they do not work with the organizations (or very little) in the actual process of transforming work conditions. The idea of training remains dominant and takes precedence over the philosophy of the IPSMH, which proposes a "training intervention" and actions to deal with the constraints experienced in the situation.

> **Suggested improvement #5**
>
> The idea of seeking to change working conditions in order to reduce constraints was discussed in the training of trainer-practitioners. However, it was the constraints that caused exposure to MSDs that were mainly addressed: weights of loads, daily tonnage, clutter, etc. The conditions that could lead to a higher transfer rate from trainees have not often been the subject of discussion: support from the team leader in using the new knowledge, temporary adjustment of return-to-work conditions to adapt them to the level of newly trained employees, etc. These aspects should also be the subject of more sustained exchanges with the TPs, especially since they feel that post-training transfer rates are low and gradually decrease over time.

These examples illustrate some of the appropriation difficulties reported in the results and the transitory phenomenon mentioned previously. Above all, they provide us with information about the impact of appropriation determinants and the possibilities of regulation that the TPs may or may not put in place.

6.2.1 Strong Appropriation of "Controllable" Aspects

The results of appropriation indicators show that the TPs have used the IPSMH in a completely satisfactory manner, in more than one respect. This effective appropriation is particularly reflected in indicators regarding content, contextualization, and to a lesser extent, the pedagogical means. On this last point, while organizing learning conditions for the theoretical component is mastered fairly well by the TPs, it becomes more difficult for them to set up such arrangements during the practical component. However, it is precisely on these aspects that TPs say they have the most control and the greatest room for manoeuvre. For example:

- They have free rein to decide on content, their expertise is recognized;

- The use of action principles is not contested, on the contrary, they are welcomed by the stakeholders because they are realistic;

- Preliminary analyses of context, which do not require staff to take time off and do not interfere with production imperatives, are usually authorized and thus make it possible to contextualize content and to take into account the learners' actual activity;

- In general, greater control is exercised over the theoretical component, because it interferes less with production than the practical component.

Although some appropriation determinants may play a role in this approach (such as the lack of support from internal actors) the TPs remain in control and can cope and adapt to these obstacles.

The same is not true for other appropriation indicators that score lower and for which the weight of certain determinants is significant. Here, it is less about appropriating concepts (and reusing them in context) than of adapting what has just been learned in order to deal with implementation constraints. It is an issue of skills that go beyond the IPSMH and are on the same order as the practitioner's skills in general. However, these regulations are far from being clear to a TP who

has just been introduced to a new training approach and who must, right from the first intervention, make adjustments of varying magnitude. It is less a question of mastering the knowledge required by the IPSMH than of negotiating and/or establishing more favourable learning conditions. Above all, it is debatable as to whether TPs have enough power to reduce the impact of some of the key determinants that are obstacles to implementing the IPSMH.

Suggested improvement #6

As this study made it possible to identify the principal appropriation determinants of the IPSMH, the creation of a relapse prevention workshop[9] could be suggested in the scope of training trainers to prepare the TPs to deal with it. Both the barriers to and the drivers of use of the IPSMH will be identified and adjustment strategies determined; they will take into account the multiple realities of TPs and their primary and secondary environments.

6.2.2 Difficulties of Appropriation and Power to Act

The duration indicators, as well as those related to retention, got the lowest scores: they are at the origin of the fact that some cases could not be qualified as exemplary in terms of appropriation. The presentation of three contrasting cases of appropriation made it possible to assess the impact that certain determinants have on the possibility of using the IPSMH in a way that respects the principal action mechanisms. The TPs are generally aware of the gaps between what the IPSMH advocates and what they are able to negotiate during their mandates. In fact, the issue of costs and budgets granted is a major determinant, a constraint, whose impacts are reflected at a number of levels and which sometimes escape the control of TPs.

Suggested improvement #7

An alternative strategy of progressive implementation of the IPSMH could be suggested, instead of a single comprehensive model. This "step-by-step" training intervention, for example, in two, or even three phases, would make it possible for TPs to negotiate training budgets that would be spread out over a longer period, enabling organizations to gradually amortize the costs. A possible disadvantage: the intervention could be halted before the end of the entire process.

The survey of component 1 of this study suggested that the OHS preventionists surveyed had an influence on sensitive aspects related to the implementation of their interventions. On the one hand, they said they had the possibility of controlling training duration. However, the TPs who participated in this study reported that one of their main difficulties was, in fact, negotiating extensions in training periods: their fees, for those concerned, are not the main factor in play. The main difficulties are associated more with freeing up trainees and the interference with production that this could cause. It also means that even TPs who do not bill directly for their services (e.g., JSAs) must also deal with this reality. Even access to workstations can sometimes be compromised if production is affected, which could partly explain why theory takes up three times

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[9] These workshops, usually held at the end of training, allow the group being trained to reflect on the obstacles they are likely to encounter when they want to use/transfer their recent knowledge, and to develop appropriate regulation strategies to deal with them. For more details, see chapter 6 in Lauzier and Denis (2016).

more time than practice. In addition, the possibility of having the learners practice constitutes the factor over which OHS preventionists say they have the least control.

The results show that TPs try to increase the total training time, for example, by including a preliminary analysis phase and/or a follow-up. However, more time does not translate into an increase in interactions between TPs and learners, which would require more time off for staff. It therefore appears that the TPs are indeed trying to deal with more complex content in training, that of the IPSMH, but by "compressing" it into the same time frame as that allotted to their previous training programs (or that available to them for other topics contained in their training portfolio).

On the other hand, the OHS preventionists surveyed during component 1 also said that they took concrete action on working conditions in order to reduce constraints. However, transformation actions are the lowest rated indicator, rarely present in the cases studied. In fact, some TPs make recommendations for transformations, but very few work with the organizations in implementing changes. Why is this the case? On the one hand, transformation means expenditures. For example, space issues are critical in handling: space is often insufficient to move feet and loads, to grasp and carry them at suitable heights and distances, to avoid having to travel too far. In many organizations, storage space is worth its weight in gold and other transformations in this regard quickly become onerous and complex to put into place. It is clear that costs are a major determinant.

During a meeting to discuss results, TPs stressed that many organizations operate in silos: the budgets of the department that manages training, where most requests come from, are not always the same as those granted for eventual transformations. This sometimes leads to difficulties in accessing transformation budgets if the requesting parties aren't from the "right" department, where the money is. Ultimately, this may be associated with intervention mandates, where a line is drawn between training and an intervention to transform work situations.

This paradox between the perception survey and the realities observed could be explained by the nature of the topics addressed in training and the pedagogical objectives pursued (e.g., raising awareness versus training). The survey of component 1 shows that in Québec, preventionists must master a considerable number of subjects related to OHS. However, these subjects do not have the same pedagogical purposes. Handling, like other similar topics such as forklift driver training, does not appear to be on the same order as training in office work, lockout, or working in confined spaces. In this case, the importance of mastering know-how (especially motor skills) is a fundamental distinction that requires different kinds of pedagogical approaches, in the field of (sensory) motor learning. The training paradigms are then different.

Suggested improvement #8

Some of the trainer-practitioner training concentrated on the particularities of handling as a work activity, which distinguishes it from other mainly manual activities. This educational activity should be enriched by comparing handling with other typical OHS topics and for which training is offered by TPs. This comparative exercise would focus on the distinctive aspects of handling in terms of learning, and the pedagogical implications flowing from it, and could serve as a support in the negotiation of mandates.

So, how much influence do TPs have in negotiating sufficient time for training to encourage the learning required for handling? What about their power to transform work conditions, when organizations usually expect the trainers to change workers' behaviours and habits? In addition to these questions about their power to influence, a major challenge is to determine the nature and importance of the possible trade-offs in the use of the IPSMH. If one admits that the inevitable compromises must be negotiated with respect to implementation of the IPSMH in order to adapt to the contingencies of organizations, when do they become unacceptable from a learning perspective?[10] For example, below what time threshold could one say that a training program will have little or no impact? What is the minimum period of time that should be devoted to practice? Conversely, can one guarantee that if "sufficient" training time is granted, the desired level of learning will be reached?

Suggested improvement #9

A theoretical portion on the major educational currents for adults in an occupational context could be added to the training of trainer-practitioners. Situating the IPSMH in relation to these various approaches would provide better understanding of the action mechanisms, the minimum conditions required for its implementation and the results that it is likely to produce. Moreover, it is not impossible to believe that the content of the IPSMH (in this case, the action principles) could be used in other pedagogical frameworks and with other means than those provided in the IPSMH. The action mechanisms leading to learning should then be specified.

6.3   Appropriating and Transferring the IPSMH: A Transitional Process

It was pointed out that the cases covered in this study were, for the most part, the first attempts by the TPs to use the IPSMH. Recall that they had been providing training for many years, with the majority using a pedagogical approach referred to as transmission, which was outlined in broad strokes during the survey in component 1. However, the training model adopted by the IPSMH is completely different. Without underestimating the impact that appropriation determinants have had on the multiple ways observed of the use of the IPSMH, it is hypothesized that many TPs who participated in the study had to make a transition (Zittoun and Perret-Clermont, 2001) from their usual practices to the one proposed by the IPSMH. The impression of an emergent appropriation and the transfer challenges posed by the IPSMH take shape when TPs' training activity is analyzed from the perspective of a transition, a passage between two training models: theirs and that of the IPSMH.

6.3.1 A Transitional Phase Between Two Training Models

What are these training models? Briefly, one is characteristic of TPs' current practices; the other is that of the IPSMH. In the first case, familiarity is acquired through the transmission of knowledge (Astolfi, 2003); the ability to learn is considered as an action of memorization and accumulation by a "virgin" brain, through a simple process of recording. This conception of learning is based on the belief that it is sufficient to do a good job of (re)presenting and exposing knowledge for it to be learned by the learner. This presupposes that the learner recognizes the message being passed by the person who holds the knowledge: the trainer's credibility rests on his or her status

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[10] This is not the only perspective that TPs must deal with. In this case, maintaining a good business relationship with the client is a determinant that should not be underestimated.

as an expert in the field (Boutte, 2005). Learners' motivation and perception of the usefulness of the concepts studied in training will depend in part on their assessment of the credibility of the messenger. This "transmissive" model reflects a vision of learning that is subordinate to teaching. In this teaching paradigm, for learning to take place, it is enough to transmit knowledge well.

In the second model, used by the IPSMH, learners are recognized as having an important role in the development of knowledge (Jonnaert, 2002). It is based on their spontaneous needs and natural and subjective interests, in relation with their environment. Importance is placed on learners' autonomy in the act of learning: they are no longer content to passively receive raw information, but select and assimilate it in order to build their own knowledge and thus be able to transfer it into new contexts. As a result, the knowledge that the learners already have is a determining factor in the act of learning (Giordan, 1996).

In this model, the relationship between trainer and learner changes. The learners also have knowledge and the trainer works by taking advantage of this prior knowledge (the "already existing") to help them build on it, by using the information made available to them. The action of learners is at the centre of the model, which is reflected by subordinating teaching to learning: the perspective is reversed compared to the other model. In this "constructivist" approach, in which learners are active, errors are symptoms that enable the trainer (and possibly the learner) to identify and understand the impact of the obstacles posed by the tasks (Astolfi, 1997; Leplat, 2009). In this learning paradigm, the participation of learners as actors in their own development is therefore fundamental. The distinction between the two models can be seen in the following comment of Henri Boudreault, who teaches professional didactics at UQAM: "a course is not designed for the person who teaches, but for those who learn!"

For the trainer, what are the consequences of the shift from a teaching to a learning paradigm? Among other things, it calls for a transition between at least two non-exhaustive and interrelated dimensions: a transition in the relationship between the trainer and learners (6.3.2) and another in the relationship between training and learners' work (6.3.3). Not everyone experiences these transitions in the same way or with the same intensity, taking into account their occupational backgrounds and tasks.

6.3.2 Transition in the Trainer/Learner Relationship

The first transition concerns the role of the trainer in relation to the learners and can be seen from two angles, one to do with identity (**a**), the other with uncertainty (**b**).

a) From content expert to mediator of learning: an identity transition

The trainers are seen as content experts. Their services are required because they are recognized specialists in a field. In OHS, this expertise is sought precisely to counterbalance the view that workers do not have this knowledge, or that it has deficiencies that must be addressed. The stance adopted by the expert strongly influences the stakeholders in organizations: the experts will come and prescribe the appropriate behaviours and good practices to adopt to avoid injuries. This stance is valued, and it certainly reflects a positive image back to those who adopt it. In this study, and although the TPs generally distanced themselves from the status of expert, behaviours that are typically associated with it were, in fact, observed.

For example, the more frequent recourse to "traditional" action principles in handling, such as postural alignment and the lever arm is one such manifestation. TPs may then point out behaviours that they feel are risky, such as twisting, bending the torso or holding the load too far from the body. It is this expertise that organizations are seeking; they are looking for specialists in human mechanics associated with MSD risks. Then, most often, it is part of a prescriptive rationale: because we know that flexion of more than 45° increases risks for passive structures such as ligaments, it should therefore be avoided. However, a principle such as balance does not (for the time being) have a "risk threshold"[11]: precarious balance, if it is well controlled, poses no more risk than stable balance, depending on the context. The principle of balance is not interpreted according to a reference value, but in terms of context: therefore, precarious balance is less desirable if the support surface is slippery, for example, or if the possibilities of recovery associated with a loss of balance are compromised by a lack of space. The expertise at issue here is first to recognize a "potential" risk in reference to the context by analyzing the handler's activity. Then, the handler must be encouraged to think of the consequences, because it is impossible to prescribe how to stay in constant balance. It is this expertise as a <u>mediator</u> that the IPSMH targets.

Before describing this mediator role in more detail, let us return to an earlier remark that the recognition of the content expert (and the credibility attributed to her or him) is an important condition to ensure the success of a training program in an approach rooted in the model of transmission of knowledge. Why is it so essential? A recognized trigger for learning is dissonance, which can be expressed as being a "disparity" from what is known and which creates discomfort or destabilizes the learner (Festinger, 1957). A trainer who communicates new and credible information is likely to cause this state of cognitive and emotional discomfort. Learners will then seek to reduce it in order to establish a new balance: in other words, either they ignore the new information (and then no learning will take place) or they will try to find meaning and will want to integrate it into their cognitive structure (Piaget, 1975; Thiévenaz, 2017). However, in an approach in which learners are in listening mode (and therefore not active), the role of the trainer in the genesis of this cognitive dissonance and in supporting the learners' quest for meaning is essential. It is hypothesized that this role cannot be fully assumed unless the trainer is sufficiently credible in the eyes of the learners, especially if the interaction is short, as is often the case in vocational training. Without this approving view, the learners will not recognize the usefulness of the concepts discussed and will not seek to find meaning in the new information: learning will then be compromised. This means that a lack of credibility can constitute a wall between the trainer and the learner that blocks learning.

In a model in which learners are active, the trigger for the learning process is no longer solely the trainer's speech, but rather the learners' own activities and the result of their actions. In fact, by offering the learners concrete activities to put them into action (e.g., workshops, artefact manipulation, problem solving), the trainer will indirectly elicit the desired disparity: learners will realize for example that they cannot perform the tasks proposed, they will make mistakes, fail to do things, the quality of their work will be poor, they will take more time than necessary, etc. In handling, learners will realize, for example, that they move unnecessarily with loads in hand, that they often twist their backs or handle the same loads more than once. Connections can be made between these ways of doing and the context: cluttered worksites explain why it takes so much time to move around, the positioning of equipment is the reason they must twist themselves or the work organization forces them to handle or re-handle things. The trigger for learning does not depend only on what the trainer says and the credibility of his/her message, but above all on the

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[11] In addition to alignment and the lever arm, this is the case for the other seven action principles.

learners who acknowledge that they are unable to accomplish what is requested, that they cannot do it effectively or in a completely safe manner. It then becomes difficult to ignore these facts, to sweep them under the rug, and not to question their ways of doing things and/or the inadequacy of their environment (e.g., clutter, poorly adapted equipment).

In so doing, the trainer adopts the posture of a mediator of learning (Lenoir et al., 2007). This role is based less on the ability to lecture and prescribe and more on the ability to create conditions conducive to learning and to support learners *in situ* (through feedback on their performance) in the concrete resolution of problems that they encounter or in a reflective process, if the solutions are not within reach. The trainer must be able to identify gaps in performance so that learners become aware of them and participate in the process of seeking solutions, problem solving or reflecting on these actions, which (and this is the gamble), will lead to learning. In reference to balance in handling, the trainer could identify problematic situations, reproduce them in simulation workshops (e.g., handling objects while climbing up a ladder or a staircase) and encourage exchanges with and among the learners on the impacts of working in such a situation that strains the quality of balance. The trainer's role is then more hidden and is less about what is said than about what must be done: she becomes the architect of learner development by setting up teaching activities adapted to learners and for which she ensures facilitation and follow-up. To use an analogy, a mediator is more of a director than the central actor in the play being performed.

These two stances do not have the same status in terms of recognition and may have an effect on the professional identity of trainers (Gaudreault, 2011). As paradoxical as it may seem, the status of the expert/trainer, while better recognized in organizations, is the one that has the least impact on learning for proponents of a constructivist approach. Going from content expert to mediator is therefore not without consequences for the trainer.

b) *From known to new: a transition from tolerance to uncertainty*

Identity is not the only factor to consider in this role transition. The trainer's control over the training approach (content studied, time spent on each subject, scheduled periods for questions and exchanges, etc.) is another aspect that should not be underestimated. In certain types of training where regulatory and normative issues are significant, preventionists have stressed the importance of covering all the subjects included in the framework of training because of liability issues (Denis et al., 2011c). In doing so, they ensure compliance and cannot be held responsible if undesirable events occur as a result of training. Adoption of the transmission model makes almost perfect control of training possible. It ensures that what will be seen is narrowly defined and that there is strict control over time, especially when training time is limited. There are fewer sources of disruption and unknowns to control in a classroom where everyone is seated, away from the hazards of production.

The same level of control is almost impossible in the position of learning mediator. The conditions for putting the trainees into action often require more time (e.g., setting up work teams, explaining instructions, taking the time to perform tasks that may vary between individuals or teams, etc.). Above all, in this model, the trainer will likely deal with novelty and the uncertainty that accompanies it. As one TP pointed out:

> But that's it, it's not a given for everyone. You have to… then like I saw my co-workers they never wanted to get involved in this, <u>there's too much uncertainty</u>. But you believe in it. […]

> *When I'm really busy, I'd like it to be an easy course [laughs]. That I'd have almost nothing to prepare, a course that's ready to roll, I'd just have to go into the group and give it.*

Temporal uncertainty of course, but also uncertainty about the nature of the problems that the learners will experience, the nature and the number of questions they will ask, and the emotional reactions they may have (such as discouragement or denial). In this case, novelty is often expressed through learners' comments about their environment and whether or not they have the opportunity to use the concepts they have learned: "We never do it like that here." The trainer must then position himself; often with minimal knowledge of the way things are usually done in the environment. Ambiguity can accompany this novelty. Ambiguity is a moment in which an answer cannot be found. In addition, very often, there is no single or correct response to a problem, but several. When an issue creates ambiguity, one should take advantage of the opportunity to be creative and explore all the options possible and to take advantage of it to exchange and debate.

Not all TPs are equally comfortable when faced with uncertainty and the ambiguity that accompanies it: it can provoke anxiety (Bettes, 2017). Tolerance of uncertainty is a quality to be developed for anyone who aspires to a role as a mediator of learning. Once again, the transition between control of the known (with its advantages) and the reception and management of novelty can affect the person experiencing it.

6.3.3 A Transition in the Training/Work Relationship

This second transition highlights the role of training in relation to the work of learners. It is the compatibility between training and the work for which it is designed that will be discussed (again from two angles) namely the usefulness of the knowledge covered (*c*) and the needs of the clientele concerned (*d*). Here, it is essential to situate the specific context in which this transition will be discussed. Readers should keep in mind that, for the time being, OHS training provided in the workplace rarely benefits from optimal pedagogical conditions. This study demonstrates this for handling training programs, showing, among other things, the considerable time constraints to which they are subject. In this reality (which is not that of traditional school and educational environments) it becomes essential to make choices, particularly in terms of content. Ideally, a trainer would not have to make these choices, but it is utopian to think that such brief training programs make it possible to cover, and, above all, to master all the knowledge deemed relevant.

c) From passive listening to action: a transition in useful learning at work

Bearing in mind the concept of compromise that often accompanies OHS training, the issue here is to determine which knowledge is most relevant to the work that is the subject of training (knowing that it is unrealistic to cover it all). The intention here is not to enter into the fine details of identifying the knowledge that the trainer will find useful to discuss. Besides, the action principles were specifically designed to identify and understand knowledge useful in context to facilitate this selection exercise. The idea, instead, is to discuss the various types or broad categories of existing knowledge, and the links with the most appropriate pedagogical models to encourage learning (Malglaive, 1990). This problem is complex and only an overview will be given to the reader.

In a transmissive model, declarative and procedural knowledge is the subject of learning, above all (Lohman, 1989). Declarative knowledge is general knowledge of a theoretical and disciplinary nature: concepts, laws, principles, etc. When TPs teach, for example, the risks of MSDs or

anatomical concepts, they refer to this category of knowledge. Procedural knowledge refers instead to methods, process, procedures, instructions, etc. Teaching the key principles of the safe technique or talking about the best way to position one's feet when lifting loads is procedural knowledge. It is more associated with action, in that it specifies a way of doing things. Practical knowledge is a subcategory of procedural knowledge: it is familiarity in use that always refers to a way of doing things, but in reference to a given context or situation. It is therefore more pragmatic (Chené, 1995).

This knowledge, more naturally associated with the transmission model, generally has the function of facilitating understanding in a field of knowledge, context and/or a situation. It makes it possible to influence the action, to guide individuals in the performance of their tasks, raise their awareness or alert them to more critical or problematic aspects. However, this diversity of knowledge remains in the realm of cognition (in the head, one might say, to give an image) and does not necessarily translate into concrete action, as the general representation sometimes suggests: just because you know how to do something doesn't mean that you are able to actually do it or do it effectively (Jarvis, 1992). If that were the case, there would be many more competent golfers! There is no magical transfer between theory and its application in actual situations, which are often unpredictable and subject to a host of constraints.

In a constructivist model, know-how and skills development (or knowing how to act) are paramount.[12] In short, skills are the way people will use their situational knowledge to perform their tasks and solve problems (Le Boterf, 2002). One of the ways it can be assessed is through work planning strategies. Know-how, on the other hand, is directly related to handlers' (motor) behaviours and the techniques they use in context (Tardif, 2006).

According to the National Research Council (2001), mechanical stressors are associated with the handling injuries recorded. However, know-how will inevitably have a role to play in the intensity of that stressor, which is why it is given importance in handling in a preventive perspective. Handlers must not only learn how to move a load from point A to point B, they must, above all, learn how to do it 100, 500, 1000 times a day in a way that does not overtax their main work tool, their bodies: that is where the preventive knowledge of handling resides (Denis et al., 2013). Precautionary (or preventive) knowledge is thus added to the occupational skills that cannot be learned separately (Cloutier et al., 2012). Handling training will be more likely to succeed if it deals with both precautionary and occupational knowledge because they are grouped together.

What has been discussed here can be traced back to the concept of interaction (Charlier, 1999): what are learners exposed to and which system[13] (cognitive or motor) is most likely to be used by them? The answer to this question will largely determine the nature of the learning that will be encouraged. It is then possible to ask if this learning has relevance in enabling learners to do their work safely.

In the transmissive model, learners are in direct contact with knowledge through an interaction using language (or semiotics: the trainer speaks and/or projects slides) that preferentially engages their perceptual-cognitive system. Their attention level and ability to perceive, select and process

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[12] A diversity of knowledge is likely to be addressed in any type of pedagogical approach. The idea proposed is that a model is better suited to the learning of certain categories of knowledge.

[13] The essential role of emotions is not discussed here because it would require too much time to explain.

the information being transmitted are important (but not sufficient) conditions for the learning undertaken. It is thus possible to increase knowledge and understanding in a particular field.

In the constructivist model, the dominant interaction is corporal. In handling, it will take the form of an activity during which loads will be handled, handling aids will be used, etc. The sensorimotor system mainly manages interactions with these objects: the development of motor skills is then central, not only to learning, but also constitutes an essential condition in the prevention of MSDs for this activity. In fact, interaction that uses language, a characteristic of knowledge transmission, does not prepare the sensorimotor system to manage interactions with objects and the space in which they are moved, nor does it enable preventive skills to be developed. No links can be established because these are two systems that use distinct information storage processes (memories). People develop know-how by direct interaction with the context through their sensorimotor systems, and not in any other way (Malglaive,1994).

So, what types of learning or knowledge does one need in handling? In fact, the real question is what knowledge do learners need <u>first</u>, because every task requires a range of distinct kinds of knowledge, but they may not all be of equal importance, at least in the initial phase of learning a trade. To answer this question, it is essential to use the work and the topic to be covered in training as the reference point. For example, for lockout training, what is the nature of the knowledge required? As far as the authors are aware, these training programs are based on learning the appropriate method of lockout and its general principles: where to put the locks, in what order, when, for what reasons, etc. It is above all declarative and procedural knowledge (or practical knowledge, if is contextualized). In this case, it would be a waste of time to perfect the physical movement required to install a lock. Theoretical training here can completely satisfy the needs of workers who must use these lockout procedures, knowing that practice will never hurt. There is no doubt that understanding the protective concept behind neutralizing the energy of electrical sources by installing locks largely outweighs developing the ability to install them, i.e., the motor skill. The precautionary knowledge conveyed an oral presentation (where to put the lock, how many, in what sequence) can be dissociated from the movements (or know-how) that make it possible to install them. There is no need to deal with them together and it makes perfect sense to give precedence to the former. Are the workers going to lock up? Nothing is guaranteed, but it is reasonable to believe that the reason given for not doing so can only be that they didn't know how to do it.

However, can the same be said about handling, or driving counterbalanced forklifts? Is it enough, for example, to hear about an MSD risk to know how to protect yourself, or about a work technique to know how to apply it properly? Let's use an analogy to respond to these questions. To prevent the risks associated with swimming, several concepts can be dealt with in transmittal mode. There are the usual rules such as "never dive from a 10-metre springboard or from a cliff above a lake; don't run around a pool or near the water; don't dunk your friends, etc." This is not about mastering an action, but of knowing and understanding the relevance of these rules to avoid an injury.

To complete the portrait, you still have to know how to swim! You don't learn how to swim by having swimming techniques explained to you, without putting them into action (unlike installing a padlock). Swimming, just like handling loads or driving a counterbalanced forklift, requires motor skills and know-how. Motor engagement and repetition of the movements are the essential conditions for learning. Swimming in a pool is not the same as swimming in a lake or a river: the practice that corresponds best to situations in which knowledge will be reinvested is crucial.

The combination of both types of knowledge is preferable to prevent the risks involved in swimming: knowing the safety rules <u>and</u> learning how to swim. The same applies to handling. Knowing the main risk factors and injury mechanisms <u>and</u> learning how to handle loads is the best combination to prevent MSDs. If there is only time to give a swimming lesson in half a day (as is the case for handling), the priority should be in knowing how to swim: although insufficient to cover all the risks associated with this activity, this knowledge is possibly the most essential to master in this context. Having a competent instructor to fine-tune it would be beneficial. Learners will not be able to swim properly after three or four hours, but they will have learned the basics. They will then be able to continue and perfect what they have learned on their own.

The reader understands that this situation would never be used in a reference manual on teaching swimming. It should be noted, however, that this imperfect pedagogical situation is illustrative of the training conditions currently offered to handlers and the compromises that are sought. Consequently, faced with the multitude of topics for which they must train and the conditions that are offered to them to achieve this, TPs must sometimes make agonizing choices. The transition from one training model to another is not at all obvious, let alone their necessary coexistence, which is required by a training practice as diversified as those of Québec preventionists, and also in environments that are just as diverse.

d) *From trainer to negotiator: a transition between the needs of the clientele concerned*

Workplace training is atypical in that the requesting party is rarely the one directly receiving the service. TPs find that they must take into account two levels of needs, which are too often incompatible: those of the requesting client (who pays the costs) and those of the target clientele receiving the training. This study clearly highlights the dilemma experienced by most of the TPs observed. Yet, to paraphrase Boudreault: *a course is not designed for the one who pays, but for the one who receives.*

It does not seem useful to further elaborate on this reflection, even though it could be the cornerstone in the intended use of the IPSMH. It must simply be established that trainers must often also play the role of negotiator if they want to do their jobs and give themselves sufficient flexibility to fulfil their mandates. As long as the TPs' approach has little or no effect on production and the freeing up of employees, they enjoy a lot of freedom. Otherwise, they must be more or less persuasive to achieve their goals. While the analysis of the activity of handlers is considered an essential condition in the development of a handling training program, taking into account the requesting organizations' work activity and their constraints appears equally essential to consider in order to negotiate adequate training conditions.

Finally, one must not overlook the secondary environment of TPs (their employers) and the mandates that they are given, as well as their own objectives. The reality and scope of action of a consultant or an internal trainer in an organization may not be the same as those of a Québec public health official or a joint sector-based association: negotiation tactics are certainly not similar. For example, specializing in a single subject rather than being a generalist, covering the entire province of Québec or working in a given administrative region, having or not having training quotas to respect, being given a mandate to raise awareness or to intervene, will inevitably have an effect on how training assignments are determined. The IPSMH is certainly not compatible with all these spheres.

Suggested improvement #10

Additional training in negotiation and "sales" could be considered, but adapted to promote prevention and OHS training activities, including handling. A better understanding of the needs and principal constraints of those requesting services appears useful to develop among TPs.

6.4   Supporting TPs to Ensure IPSMH Appropriation and Transfer

The transitions mentioned above can be difficult for TPs to experience, to varying degrees. The few appropriation determinants that hinder the implementation of the IPSMH can also have a deterrent on its use. The research team is encouraged by the fact that TPs have reported having a heightened sense of self-efficacy after training. According to Bandura's theory of self-determination (1997), a high sense of self-efficacy is manifested, among other things, by increased perseverance in using learning outcomes despite the difficulties encountered.

Thus, the training of trainers to prepare preventionists appears to be an indispensable condition for the appropriate use of the IPSMH. The complexity associated with its mastery is too great to imagine doing without such training: without it, there is a risk of slippage. In addition, the four-day duration of this training should (taking into account the proposals for improvement made) be increased and spread out over five days. Support during its first use is also recommended, especially for those who have a lower self-efficacy score at the end of the training. Accreditation could be issued to those who have met the training requirements, a kind of recognition of qualification for its use. Since the IRSST does not have a training mandate, the training of IPSMH instructors could be entrusted to third parties who have themselves been accredited to act in this capacity, thus increasing the possibilities for training preventionists.

Nevertheless, some of the barriers that TPs have faced are beyond their full control: their self-regulation power is thus limited. The ten proposals for improvement of the IPSMH and its training program will partially correct the situation and mitigate the difficulties that TPs may have experienced in their first attempts to use this innovative handling intervention approach. Experimenting with the IPSMH more than once is sure to help, since familiarity with the approach is correlated with a sense of self-efficacy. TPs report becoming more comfortable with the approach and improving their ability to mediate with practice. But these conditions may not be sufficient. A critical mass of stakeholders will have to be trained to create a ripple effect. Ideally, this approach would also be promoted by the main OHS bodies in Québec: the CNESST, the IRSST, public health, joint sector-based associations concerned with handling, professional associations, prevention mutual groups, employer and union OHS associations, etc. This support would ensure greater credibility for the IPSMH and make it an essential approach for those wishing to prevent handling risks. Since the end of the monitoring period of this project, such support has taken shape and is expected to increase in the future.

Summary of the discussion:

The IPSMH is versatile and appreciated by stakeholders. New opportunities in the field of rehabilitation are even being considered;

Although the results regarding IPSMH appropriation and transfer are generally satisfactory, work remains to be done. The research team makes ten proposals for improvement to overcome the difficulties observed. Two of them (4 and 9) deal with the various pedagogical approaches in popular use and which were only rarely addressed during the training of TPs;

Although some barriers to the use of the IPSMH may be controllable by the TP, other aspects are beyond their control. In many documented cases, there is still a gap between the prescribed IPSMH and its use in real life, which requires varying degrees of adaptation;

In addition to these barriers that TPs are struggling to deal with, they must themselves adapt to this new approach, which, for most of them, contrasts with their usual training practices;

A transition in at least two dimensions is noted. One concerns the relationship between the trainer and the learners, while the other concerns the relationship between training and the learners' work;

The first transition confronts TPs with their identity as trainers and their ease in managing uncertainty: it affects them in a more personal way in their role as trainers and in the recognition they receive;

The second transition is of a different nature, more related to the perceptions or conceptions of TPs regarding the role played by prevention training. Emphasis is paid here on adapting the training to the specificities of the work for which it is designed and on the ability of TPs to negotiate the conditions so that training can fully assume its role;

These transitions, experienced differently depending on the experience and employment of TPs, can be difficult and discourage some from persevering: TPs must be supported to do so. The research team proposes various avenues for this purpose.

6.5   Limits of the Study and Perspectives

The main limitation of this study relates to the multiple objectives that the researchers have set for themselves. The research team is fully aware that it would have been in its interest to divide this project into phases. For example, the evaluation of the training of trainers for component 2 could have been enriched if a research project had been entirely devoted to it. In addition, the team had planned to reuse the questionnaire administered in post-training after the first TP training intervention. However, because of the cumbersome nature of the data collection system and the frequent requests made to the TPs, it was decided to invest energy elsewhere. In component 3, given the extent of the follow-ups to be carried out and taking into account the available resources, more emphasis was placed on studying the theoretical part of the training,

and less on putting it into practice, which would have required more substantial resources. In a more limited research project, such decisions might have been avoided. The researchers remain convinced that, given the circumstances at the outset of this project, the estimated time required to reach conclusive results and the funding dynamics for this type of study, the decision to carry out a project of this size was the best.

The fact that there is an over-representation of ergonomists in the TP group may constitute a bias. Despite all of our recruitment efforts to broaden the skills profile of TPs, the team was unable to assemble a representative group of stakeholders in the survey of component 1. However, the TPs who were not ergonomists, and who had absolutely no training in OHS, were able to apply the IPSMH very effectively, although it would have been preferable to have a larger number of these practitioners to confirm this trend. This point has been raised previously, but the fact that the very first experiences with the use of the IPSMH were further developed may have had an impact on the appropriation indicators evaluated. Failure to do so would certainly have contributed to reducing the number of cases to be monitored: a conscious decision was made to favour a larger number of cases, to the detriment of the quality of appropriation.

As for future prospects, an evaluation phase on the effects of the IPSMH on MSD prevention appears necessary. It would certainly add to the credibility of the IPSMH by showing the effects that can be anticipated if it is used in accordance with the intended action mechanisms. An economic evaluation is also desirable to assess the return on investment. In addition, the unanticipated use of the IPSMH for clients working in the rehabilitation field was a pleasant surprise and a new avenue for this material. However, since it was not designed for this purpose, the development of an approach adapted to this context by the IPSMH seems useful.

In conclusion, this time with a view to enhancing the value of the work, the improvement proposals set forth should be prepared. Steps to try to build a critical mass of practitioners in the coming months and years and to determine the best way to do so should be initiated.

7. CONCLUSION

This study demonstrates that an approach to handling training based on action principles could be used in many organizations for a variety of handling tasks, with diverse clienteles, and by preventionists with different profiles: it is versatile. TPs report client satisfaction with this approach. It is seen as being more in line with both the actual activities of handlers and the organizational realities of the workplaces requesting these services.

The IPSMH's main action mechanisms, evaluated with ten appropriation indicators, were respected by the majority of TPs observed in actual interventions in the workplace. Some of these indicators were, however, rated lower. This was particularly the case for the duration of training, which is generally too short and has an insufficient ratio between theory and practice, as well as for actions to transform working conditions, which remain extremely rare. This final point is concerning: the IPSMH should not place the entire weight of prevention on the shoulders of workers alone. It is imperative to act at the same time on the workplace restrictions: excessive weight of loads, cluttered spaces, inappropriate heights for picking up and depositing loads, etc.

Several appropriation determinants are an obstacle to the prescribed implementation of the IPSMH, which already forces newly trained TPs to engage in regulatory activities of varying scope. Proposals to improve the IPSMH and training of trainers are made to help TPs overcome these barriers. Moreover, this preparatory training in the appropriate use of the IPSMH has been found to be effective in equipping preventionists, as assessed through various post-training transfer predictors. It is therefore considered one of the essential ingredients in the development of a good sense of self-efficacy (which provides some assurance of perseverance in the face of obstacles), and to avoid improper use of the approach, which is perceived by the TPs as having a fairly high level of complexity.

In addition to the impact that the appropriation determinants could have on various forms of adaptation of the IPSMH, we note that the appropriation process is incomplete. It is assessed through the transitions experienced by TPs that lead them to finally abandon a training model based on the transmission of knowledge, which nevertheless offers a number of advantages. They must ensure the transition to a constructivist paradigm of training that contrasts with their current practices, most of which they may have adopted many years ago. While each TP, depending on his or her background and professional status, may experience these transitions differently, they can be destabilizing and discourage some from pursuing this avenue. Some actions with the aim of supporting TPs have thus been suggested. Among them is the development of a critical mass of practitioners and the recognition of the approach by recognized OHS organizations so that it becomes indispensable and recognized as the benchmark in terms of handling training.

The results of this study show that it is possible to appropriate the IPSMH and to use it in an actual intervention context. The research team is now ready to move on to the final phase of evaluating the impacts of this approach on the prevention of MSDs associated with handling.

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APPENDIX 1:
PREVENTION PRACTICES IN OCCUPATIONAL HEALTH AND SAFETY QUESTIONNAIRE

Read the following carefully before completing the questionnaire!

We are requesting your participation in a study to **establish a representative portrait of Québec actors and their current handling training practices.** Your participation in this research project will consist of answering the questions in this questionnaire. It will take approximately 15 minutes to complete.

The data gathered through the study are completely anonymized, making it impossible for you to be identified. The results of the research will not identify the participants. The overall results of this study will be disseminated in the form of articles in specialized journals and/or lectures presented at scientific conferences.

This research involves minimal risk to participants. The data collected will be stored only in electronic format and only the research team members will have access to it. It should be noted, however, that the file containing data from the study may also be used for subsequent analyses conducted in future research.

Your participation in this study is voluntary. You are entirely free to participate or not, and to withdraw at any time without any penalty.

This research project has been approved by the research ethics committee of the Université du Québec en Outaouais. If you have any questions, please contact (…).

INSTRUCTIONS
1.   Read the instructions carefully before answering.
2.   Answer frankly and honestly.
3.   Answer each question quickly; do not dwell unnecessarily on a question, instead, provide the response that naturally comes to mind.

Section A. Sociodemographic and work environment information

1. What is your gender?
a. Male   b. Female

2. How old are you? _____

3. What is the highest level of education you have completed?
a. Primary school   b. High school   c. College   d. Bachelor's degree
e. Postgraduate (Masters or PhD)

4. Who do you work for? *(A public or parapublic organization refers to federal, provincial and municipal organizations and public health networks).*
a. A public or parapublic organization;
b. An organization other than public or parapublic (e.g., private sector organization);
c. Self-employed.

5. Your organization is:
a. Very small (between one and 20 people);
b. Small (between 21 and 50 people);
c. Medium (between 51 and 199 people);
d. Large (200 employees or more);
e. I don't know.

6. How long have you worked in the field of occupational health and safety (OHS), including your current experience? _____ years.

7. How long have you worked for your current employer? _____ years.

8. How much (in percentages) of your professional activity is devoted to preventing occupational health and safety risks?

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

9. Please indicate the degree to which the following statements accurately describe the management philosophy of your organization (1 = Does not describe the organization's management philosophy at all; 2 = Somewhat describes the philosophy; 3 = More or less describes the philosophy; 4 = Describes the philosophy well; 5 = Completely describes the organization's management philosophy).

9.1	Our range of training products is addressed to targeted clientele	1	2	3	4	5
9.2	We regularly follow up with our clients after providing training	1	2	3	4	5
9.3	We regularly create new training products	1	2	3	4	5
9.4	The number of training courses to be delivered (quotas to be respected) is an obstacle to the continuous improvement of our practices and services	1	2	3	4	5
9.5	Our training products are inspired by the most recent developments in the field	1	2	3	4	5

10. Your sector of activity…

Sector of activity	Which sector do you work in? (check the appropriate boxes)	Which is the main sector you work in? (identify the three main sectors)
10.1 Primary industries, public service and construction	☐	☐
10.2 Manufacturing industries, and repair and maintenance services	☐	☐
10.3 Accommodation, food service, personal and organizational services, arts and entertainment	☐	☐
10.4 Production support	☐	☐
10.5 Transportation, storage, and waste management services	☐	☐
10.6 Commerce	☐	☐
10.7 Health care and social assistance	☐	☐
10.8 Teaching	☐	☐
10.9 Governmental and para-public services	☐	☐
10.10 Other, specify _____	☐	☐

11. Over the past year, how many training activities have you participated in? *(activities you attended as a participant)*
I have participated in _____ training activities.

12. Which of the following prevention activities are you involved in, and how much time do you spend on them? (in percentage)

Activity	YES / NO	If yes, how much time do you spend on these activities?
12.1 OHS information and training	YES / NO	___% of my time is devoted to this activity
12.2 Emergency measures and first-aid	YES / NO	___% of my time is devoted to this activity
12.3 Accident management and analysis (investigations), management of CNESST files	YES / NO	___% of my time is devoted to this activity
12.4 Management of disabilities, return to work, rehabilitation and temporary assignment	YES / NO	___% of my time is devoted to this activity
12.5 Design and follow-up of a prevention plan, identification of risks, inspections and preventive activities, participation in the HSC, health monitoring	YES / NO	___% of my time is devoted to this activity
12.6 Action on facility layout, equipment and PPE, actions on work methods and work organization	YES / NO	___% of my time is devoted to this activity
12.7 Other activities; specify _____	YES / NO	___% of my time is devoted to this activity

13. Where do you carry out your work? *Indicate your three main choices.*

a. Bas-Saint-Laurent   b. Saguenay–Lac-Saint-Jean   c. Québec City region
d. Mauricie   e. Estrie   f. Montréal
g. Outaouais   h. Abitibi-Témiscamingue   i. Côte-Nord
j. Nord-du-Québec   k. Gaspésie–Îles-de-la-Madeleine
l. Chaudière-Appalaches   m. Laval   n. Lanaudière
o. Laurentides   p. Montérégie   q. Centre-du-Québec
r. Outside of Québec

14. What is the size of the organizations in which you intervene the most often?
a. In very small organizations (between 1 and 20 people);
b. In small organizations (between 21 and 50 people);
c. In medium-sized organizations (between 51 and 199 people);
d. In large organizations (200 employees and more);

Section B. Your prevention practice and your training activities

15. When you provide training, it is possible for you to determine:

	Never	Rarely	Sometimes	Often	Always
15.1 The duration	1	2	3	4	5
15.2 The topics to be addressed	1	2	3	4	5
15.3 The location	1	2	3	4	5
15.4 The number of participants	1	2	3	4	5
15.5 The possibility of having learners practice	1	2	3	4	5

16. What are the three subjects for which you provide the most training?
a. Confined spaces;
b. Handling, safe transport of loads;
c. Forklift trucks;
d. WHMIS;
e. Safety of machines and tools;
f. Prevention of MSDs and physical risks;
g. Risks to psychological health;
h. Chemical and/or biological risks;
i. Lockout;
j. Accident investigations and analyses;
k. Operation of HSC;
l. OHS standards, regulations and laws;
m. Office ergonomics;
n. Workplace inspection;
o. Respiratory protection;
p. Other; specify _____.

17. What is the average duration of your training programs? *(average duration refers to the time spent in the workplace interacting with participants, and does not include preparation work)*
a. Less than half a day
b. One half-day   c. One day   d. One and a half days
e. Two days   f. More than two days

18. In general, what is the average size of groups that participate in your training programs?
_____ participants per training session.

19. In general, what are your preferred teaching techniques when you provide training?

	Never	Rarely	Sometimes	Often	Always
19.1 Lecture	0	1	2	3	4
19.2 Discussion	0	1	2	3	4
19.3 Demonstration	0	1	2	3	4
19.4 Training in the task (putting new learning into practice)	0	1	2	3	4

20. In general, what pedagogical tools do you use in your training activities?

	Never	Rarely	Sometimes	Often	Always
20.1 Videos	0	1	2	3	4
20.2 Slideshow (e.g., PowerPoint presentation)	0	1	2	3	4
20.3 Learners' guide	0	1	2	3	4
20.4 Training aid	0	1	2	3	4
20.5 One or more case studies	0	1	2	3	4

21. How often

	Never	Very rarely	Rarely	Occasionally	Frequently	Very frequently	Always
21.1 does your job make you work very hard?	0	1	2	3	4	5	6
21.2 does your job leave you little time to do what there is to do?	0	1	2	3	4	5	6
21.3 is there a lot to do?	0	1	2	3	4	5	6

22. What influence do you have over (unit refers to your work group)

	No influence	Very little influence	Little influence	Some influence	Enough influence	A lot of influence	A great deal of influence
22.1 obtaining supplies and material necessary for your work?	0	1	2	3	4	5	6
22.2 the order in which you perform your professional tasks?	0	1	2	3	4	5	6
22.3 the quantity of work you carry out?	0	1	2	3	4	5	6
22.4 your work pace? (i.e., how fast or slow you work)	0	1	2	3	4	5	6
22.5 The decisions related to the division of tasks in your unit?	0	1	2	3	4	5	6
22.6 your hours and your work schedule?	0	1	2	3	4	5	6
22.7 the decisions related to when things are done in your unit?	0	1	2	3	4	5	6
22.8 the training of other employees in your unit?	0	1	2	3	4	5	6
22.9 the policies and procedures in your unit?	0	1	2	3	4	5	6

23. At the end of the training you provide, to what extent do you feel that the learners

23.1 master the concepts and knowledge taught?	Poorly Very well 1 2 3 4 5 6 7 8 9 10
23.2 intend to apply the concepts and knowledge taught?	Not much A great deal 1 2 3 4 5 6 7 8 9 10
23.3 are motivated by the idea of using their new knowledge in the scope of their work?	Not very Very 1 2 3 4 5 6 7 8 9 10
23.4 find the means necessary to transfer their new learning?	Few means Many 1 2 3 4 5 6 7 8 9 10

24. Given the training that you generally offer, to what degree do you feel that the learners transfer their new knowledge? (i.e., apply what they have learned in the scope of their tasks)**:**

24.1 As soon as training ends: ____%

24.2 One month after training: ____%

24.3 Six months after training: ____%

25. In your opinion, who has the responsibility of ensuring transfer of learning? (Add up the roles to reach a total of 100%)**:**

25.1 Learners: _____%
25.2 Trainer: _____%
25.3 The immediate supervisor (of learners):   _____%
25.4 The organization: _____%

26. How do your training programs take place?
a. In a single session   b. In several sessions over time (divided up)

27. Based on your experience, please indicate how much you agree or disagree with each of the following statements:

If the learners do not transfer their new knowledge once the training ends, it is because	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
27.1 the learners are not evaluated or compensated for the use they make of the knowledge and skills recently acquired in training at work.	1	2	3	4	5
27.2 the learners are not motivated to use the new knowledge and skills on the job.	1	2	3	4	5
27.3 there is too little time for the practice and repetition of the new skills during training.	1	2	3	4	5
27.4 the learners' immediate supervisor does not encourage application of the new knowledge and skills at work.	1	2	3	4	5
27.5 the learners do not attach much importance to the concepts and knowledge taught in the training program.	1	2	3	4	5
27.6 the learners' co-workers do not encourage the application of the new knowledge and skills at work.	1	2	3	4	5
27.7 the learners lack opportunities to apply their new knowledge and skills at work.	1	2	3	4	5
27.8 the use of the knowledge and skills recently acquired in training is not valued at work.	1	2	3	4	5

Questions 28 to 32 deal specifically with handling training activities.

28. In your job, what percentage of prevention activities deal with handling?

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

29. Taking into account the elements below, please indicate the extent to which your training programs in handling differ from other training programs that you generally offer.

	Totally different	Very different	Different	Similar	Very similar	Exactly the same
29.1 The duration	1	2	3	4	5	6
29.2 The number of participants	1	2	3	4	5	6
29.3 The possibility of learners' being able to practice	1	2	3	4	5	6
29.4 The time allotted for preparation	1	2	3	4	5	6
29.5 Participants' interest and motivation	1	2	3	4	5	6

30. If you were to offer a new training program in the future, how would you rate your ability to do each of the following correctly? Please assess your general abilities as honestly as possible against the statements below by circling the answer that best describes you (1 = Lowest ability level; 10 = Highest ability level):

Identify the most problematic handling situations in a workplace by combining different data sources (e.g., accident data, worker complaints, observations of work situations). (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)	
Describe, analyze and make a judgment about the ways of doing things (handling methods) of workers affected by these problematic situations. (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)	
Identify the primary determinants (technical, organizational, social or personal) involved in these problematic situations and influence stakeholders to transform them. (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)	
Report to the workers concerned on the results of your analyses and encourage them to discuss and reflect on the problems they encounter and the potential solutions to focus on. (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)	

31. What is the most important message (key ideas) that you would like to convey to <u>participants in your training programs and to those requesting the programs</u>?
_____

32. The purpose of the rest of the research project is to train trainers in handling training and to follow up on some of their interventions. If your profile matches the desired sample group, would you be interested in participating in the next phase of our study? If so, do you consent to being contacted? If so, please provide us with your contact information: _____

33. Do you have any other comments? _____

THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY!

APPENDIX 2:
PLANNED SEQUENCE OF THE IPSMH TRAINING PROGRAM, ACTIVITIES, DURATION, PEDAGOGICAL APPROACHES AND OBJECTIVES PURSUED

Day 1

Activity	Duration	Pedagogical approach	Objective
Activity 1: Welcome, introduction Presentation of the research project, ethics and confidentiality; Goals/intentions of this training program; Sequence and operating procedures with conceptual maps: participants' workbook; Engagement/involvement of participants (follow-up); Round-table discussion.	60 min.	Lecture	Provide an overview of the training program; Emphasize their role after training, their engagement; Icebreaker to help participants get to know each other; Ensure their consent to participate in the research project.
Activity 2: Particularities of handling Present the map; Emphasize the concept of variability; Present the concept of transitional system; Present four pairs: handling versus manipulation, transfer versus transportation, manual versus assisted, moment (overload) versus efficiency (physiological).	75 min.	Lecture	Have a common reference point, a common understanding of handling; Identify the particularities for TPs and handlers; Define key concepts that will continue during the training.
Activity 3: Efforts and their effects Present both maps (efforts and effects); Highlight the four principal types of effort and their effects; Emphasize the unitary effort broken down into four sub-efforts: maximum or initial effort, loading or sustained effort, final effort, pushing/pulling.	90 min.	Lecture	Emphasize the fact that handling does not involve excessive effort only; Show the compromise of having to take into account all the efforts made by the handler.
Activity 4: The causes or determinants of efforts Present the map of causes; Review each of the five groups of determinants: overview, demands, objects, space, distance, precision in depositing objects.	90 min.	Lecture	

Day 2

Activity	Duration	Pedagogical approach	Objective
Activity 5: Welcome and review of day 1 Plan for the day and response to questions	30 min.		
Activity 6: Overview of the rules Briefly present each rule: the action principles, the work organization principles, their origin/creation: conceptual map, why these principles? Usefulness: first developed as a reading guide, presentation to handlers?	30 min.	Lecture	Describe, analyze and make judgments about workers' way of doing things; Constitutes the core of the training program; TPs must be able to analyze the handling techniques used, to highlight the positive points, but also the compromises that could affect the OHS of workers (on-site or through videos); Be able to describe and make judgments about the handling techniques used in previously identified handling situations.
Activity 7: The four basic principles Present the rules related to initial overloading and stability of the body/load system, the more static part related to the initial positioning: alignment, lever arm, balance, grip.	90 min.	Lecture	
Activity 8: The four dynamic principles Present the rules related to the movement of the system: transition, rhythm, use of the load, use of the body.	90 min.	Lecture	
Activity 9: Analysis of work with the rules In teams of three, analysis of two handling situations: order pickers, garbage collectors. Debriefing and discussion.	105 min.	Work from the two cases; Use of videos and work data.	
Activity 10: Explanation, homework In teams of two participants, develop a practical workshop for two rules: a static rule and a dynamic rule; the workshops will be presented on day 3 (10 min./workshop)	30 min.	Lecture	

Day 3

Activity	Duration	Pedagogical approach	Objective
Activity 11: Welcome and review of days one and two Plan for the day and response to questions.	30 min.		
Activity 12: Presentation of the participants' workshops	180 min.	Participants' presentations	
Activity 13: Presentations of the teams' workshops	60 min.		
Activity 14: Presentation of evaluation tools Logbook, participant evaluation questionnaire, post-training interview, observations in the form of a shift log, discussions about follow-up issues.	90 min.	Lecture	

Day 4

Activity	Duration	Pedagogical approach	Objective
Activity 15: Welcome and review of day 3 Plan for the day and response to questions.	30 min.		
Activity 16: Integrated handling injury prevention strategy (IPSMH) and its dynamics Promote the approach with those requesting services: logic, philosophy, what is learning? Advantages: training of disseminators, resistance, etc. Choose situations to document: Lortie and St-Vincent tool and other sources; Debriefing activity with the group: learners' group (number of workers, profiles, etc.); Dynamics: dialectic, discussion, medium: on-site, through videos, etc., follow-up committee, training approaches, principal determinants; Learning after training: post-training learning conditions, monitoring of impacts, evaluation.	225 min.	Lecture	Overview of the training program (understanding the logic behind it, consistency in explaining and "selling" it when offering training programs). Identify the principal determinants involved in these situations and exert influence to transform them. Learning as a continuum that goes beyond the formal training period. Post-training learning conditions; plan for the return to workstations and monitoring of impacts. Know the conditions that support learning once the training is completed and the learners return to their workstations. Ensure follow-up of training.
Activity 17: Review of training and group discussion What the participants have to say	60 min.	Group discussion	
Activity 18: Post-training questionnaire General comments about the training received.	45 min.		

APPENDIX 3:
POST-TRAINING QUESTIONNAIRE
Determine the effects of training of trainers on various indicators to estimate the transfer by learners who have received training

Read the following carefully before completing the questionnaire!

We are asking you to participate in a research project to assess the effects of train-the-trainer courses using a variety of indicators to estimate the transfer of knowledge by learners who have completed the training. More specifically, we want to understand the usefulness of this new product, its application and its likely impact in various workplaces. Your participation in this research project will include answering two short questionnaires, this one and another that will be distributed in the coming weeks. **It will take you approximately 15 minutes to complete this first questionnaire.**

The data gathered through the study are completely anonymized, making it impossible for you to be identified. The results of the research will not identify the participants. The overall results of this study will be disseminated in the form of articles in specialized journals and/or lectures presented at scientific conferences.

This research involves minimal risk to participants. The data collected will be secured and only the research team members will have access to it. They will be destroyed after five years.

Your participation in this study is voluntary. You are entirely free to participate or not, and to withdraw at any time without any penalty.

This research project has been approved by the research ethics committee of the Université du Québec en Outaouais. If you have any questions about this research project, please contact (…).

INSTRUCTIONS

1. Read the instructions carefully before answering.

2. Create a personal identification number (PIN). This number will be used to match your responses in the two questionnaires.

3. Answer frankly and honestly.

4. Answer each question quickly; do not dwell unnecessarily on a question, instead, provide the response that naturally comes to mind.

5. Give the questionnaire back to the instructor once you have completed it.

Respond to each of the following statements by entering your answer in the space provided.

Q1.1 What is your gender?   ☐ Male   ☐ Female
Q1.2 How old are you?   _____
Q1.3 How long have you worked at the organization where you are currently employed?
_____ years
Q1.4 What is your current job title?   _____

Q1.5 What is the highest level of education you have completed?
☐ High school/vocational diploma   ☐ College   ☐ Bachelor
☐ Master   ☐ PhD

Q1.6 In which field did you complete this level of study?   _____
Q1.7 How long have you been teaching training courses? _____ years
Q1.8 How long have you been training for risk prevention in manual handling? _____ years

Q1.9 Before taking this training course, what was your degree of familiarity with this new approach (IPSMH)?
Not very familiar   Very familiar
1   2   3   4   5   6   7   8   9   10

Perceived usefulness of the training program
Q2. Respond to each of the following statements by circling the answer that corresponds best to how much you agree or disagree.
1= Strongly disagree   2 = Somewhat disagree   3 = Disagree
4 = Neither agree nor disagree   5 = Agree   6 = Somewhat agree
7 = Strongly agree

Q2.1	I think that this training course will help me do my work better.	1	2	3	4	5	6	7
Q2.2	Upon reflection, I believe that my participation in this training course was a good investment of my time.	1	2	3	4	5	6	7
Q2.3	Overall, I think that the concepts taught in this training course will be useful for me at work.	1	2	3	4	5	6	7
Q2.4	Given the usefulness of this training program, I would recommend it to my co-workers without hesitation.	1	2	3	4	5	6	7

Perceived learning
Q3. Given the first learning objective of the training course, "**Recognize problematic situations in handling in the workplace**," please estimate your level of understanding (or mastery) of it **BEFORE** and **AFTER** the training course.

		1 = Poor 10 = Excellent
Q3.1a	My level of understanding (or mastery) BEFORE the training course	1 2 3 4 5 6 7 8 9 10
Q3.1b	My level of understanding (or mastery) AFTER the training course	1 2 3 4 5 6 7 8 9 10

Perceived learning

Q4. Given the second learning objective of the training course, "**Provide relevant and complete feedback on handling techniques applied to workers**," please estimate your level of understanding (or mastery) of it **BEFORE** and **AFTER** the training course.

		1 = Poor	10 = Excellent
Q4.1a	My level of understanding (or mastery) BEFORE the training course	1 2 3 4 5 6 7 8 9 10	
Q4.1b	My level of understanding (or mastery) AFTER the training course	1 2 3 4 5 6 7 8 9 10	

Perceived learning

Q5. Given the third learning objective of the training course, "**Lead participants to adopt a new approach to handling based on the nine rules/principles**," please estimate your level of understanding (or mastery) of it **BEFORE** and **AFTER** the training course.

		1 = Poor	10 = Excellent
Q5.1a	My level of understanding (or mastery) BEFORE the training course	1 2 3 4 5 6 7 8 9 10	
Q5.1b	My level of understanding (or mastery) AFTER the training course	1 2 3 4 5 6 7 8 9 10	

Goal orientation style

Q6. Respond to each of the following statements by circling the answer that best corresponds to your level of agreement or disagreement.

1= Strongly disagree   2 = Somewhat disagree   3 = Disagree
4 = Neither agree nor disagree   5 = Agree   6 = Somewhat agree
7 = Strongly agree

Q6.1	I prefer to work on projects where I can prove my skills to others.	1	2	3	4	5	6	7
Q6.2	I'm worried about performing a task if my performance could reveal that I have poor skills.	1	2	3	4	5	6	7
Q6.3	I enjoy working on challenging and difficult work tasks where I will have to learn new skills.	1	2	3	4	5	6	7
Q6.4	I prefer to work in situations that require a high level of skills and talent.	1	2	3	4	5	6	7
Q6.5	I prefer to avoid work situations in which I may perform poorly.	1	2	3	4	5	6	7
Q6.6	I would choose a challenging work task from which I would learn a great deal.	1	2	3	4	5	6	7
Q6.7	I try to understand what it takes to demonstrate my skills to others at work.	1	2	3	4	5	6	7
Q6.8	Avoiding showing weak skills is more important to me than learning a new skill.	1	2	3	4	5	6	7
Q6.9	I get satisfaction when others are aware of my accomplishments.	1	2	3	4	5	6	7
Q6.10	I often seek opportunities to develop new skills and knowledge.	1	2	3	4	5	6	7
Q6.11	I find it is important to show that I perform better than my co-workers.	1	2	3	4	5	6	7
Q6.12	For me, developing my skills is important enough to take risks.	1	2	3	4	5	6	7
Q6.13	I would avoid doing a new task if there is a chance that I would appear incompetent to others.	1	2	3	4	5	6	7

Intention to transfer

Q7. Respond to each of the following statements by <u>circling the answer</u> that best corresponds to your level of agreement or disagreement.

1= Strongly disagree   2 = Somewhat disagree   3 = Disagree
4 = Neither agree nor disagree   5 = Agree   6 = Somewhat agree
7 = Strongly agree

In order to ensure that my new learning is applied…

Q7.1	I will discuss how to apply the knowledge I have acquired with my supervisor	1	2	3	4	5	6	7
Q7.2	I will discuss how to apply the knowledge I have acquired with my co-workers	1	2	3	4	5	6	7
Q7.3	I will think of the various ways in which I can apply my new knowledge	1	2	3	4	5	6	7
Q7.4	I will assess how I will be able to apply my new knowledge.	1	2	3	4	5	6	7
Q7.5	I will seek opportunities to apply my new knowledge.	1	2	3	4	5	6	7
Q7.6	I will review the content of the training to apply my new knowledge.	1	2	3	4	5	6	7
Q7.7	I will work hard to use the knowledge I have acquired in this training course	1	2	3	4	5	6	7
Q7.8	I will establish specific objectives to continue to apply my new knowledge	1	2	3	4	5	6	7
Q7.9	If necessary, I will ask for expert advice to ensure that my new knowledge is applied	1	2	3	4	5	6	7
Q7.10	I will examine my work environment to identify elements that could hinder the use of the skills I have acquired	1	2	3	4	5	6	7
Q7.11	I will evaluate my progress in applying my new knowledge	1	2	3	4	5	6	7

Sense of self-efficacy

Q8. Respond to each of the following statements by <u>circling the answer</u> that best corresponds to your level of agreement or disagreement.

To what extent do you feel that you are able to do the following...

		1 = Not at all								10 = Completely	
Q8.1	Identify the risks related to handling in a specific work situation	1	2	3	4	5	6	7	8	9	10
Q8.2	Communicate with the workers so that they understand the risks they are taking	1	2	3	4	5	6	7	8	9	10
Q8.3	Provide relevant examples of the application of each of the nine IPSMH rules	1	2	3	4	5	6	7	8	9	10
Q8.4	Name and explain the advantages of using the IPSMH approach	1	2	3	4	5	6	7	8	9	10
Q8.5	Explain how each of the nine IPSMH rules work	1	2	3	4	5	6	7	8	9	10
Q8.6	Suggest changes in the way of working to reduce the risks of health problems related to handling	1	2	3	4	5	6	7	8	9	10
Q8.7	Present the benefits and justify the use of the IPSMH.	1	2	3	4	5	6	7	8	9	10
Q8.8	Develop the training content necessary to conduct an activity on the IPSMH.	1	2	3	4	5	6	7	8	9	10

Other comments about the training program:

_____

APPENDIX 4:
PRESENTATION OF THE INDICATORS IN THE QUESTIONNAIRE
FROM COMPONENT 2 AND CALCULATION METHODS

Indicator	Calculation	Scale
Perceived usefulness	Average of the responses to questions Q2.1, Q.2.2, Q2.3 and Q2.4	1 to 7
Mastery of learning	Average of the responses to questions Q.6.1, Q.6.3, Q.6.6, and Q.6.10	1 to 7
Performance	Average of the responses to questions Q.6.4, Q.6.7, Q.6.9, and Q.6.11	1 to 7
Avoidance	Average of the responses to questions Q.6.2, Q.6.5, Q.6.8, and Q.6.13	1 to 7
Intention to transfer	Average of the responses to questions Q.7.1, Q.7.2, Q.7.3, Q.7.4, Q.7.5, Q.7.6, Q.7.7, Q.7.8, Q.7.9, Q.7.10 and Q.7.11	1 to 7
Sense of self-efficacy	Average of the responses to questions Q.8.1, Q.8.2, Q.8.3, Q.8.4, Q.8.5, Q.8.6, Q.8.7 and Q.8.8	1 to 10
Perceived learning		
Recognize problematic handling situations on the work site		1 to 10
Before	Response to question Q3.1a	
After	Response to question Q3.1b	
Provide relevant and complete feedback about the handling techniques applied to workers		1 to 10
Before	Response to question Q4.1a	
After	Response to question Q4.1b	
Get the participants to adopt a new handling approach based on the nine principles		1 to 10
Before	Response to question Q5.1a	
After	Response to question Q5.1b	

Scales from 1 to 7: 1 – Strongly disagree to 7 – Strongly agree.
Scales from 1 to 10: 1 - Poor to 10 – Excellent; 1 – Not at all to 10 – Completely.

APPENDIX 5:
TRAINING OBSERVATION FORM

| TAKE PHOTOS |

| OBTAIN A COPY OF THE MATERIAL DISTRIBUTED |

Date: ____ / ____ / ____   Start time: ____ : ____   Stop time: ____ : ____

Organization: _____ Number of participants in the session: _____

Location of training: _____-_____

Shift log (repeat as necessary to cover the training)

Schedule (start – finish)	Description of the trainers activity	Content studied, elements to describe: Rules discussed, which ones, how; handlers' roles: discussions, problem solving, practice, demonstrations, exchanges; integration/taking into account handlers know-how; difficulties observed; handlers' assessments
7:30 a.m.	*Beginning of training, presentation of trainer*	*The trainer introduces him/herself, announces the training objectives.*
7:40 a.m.	*Round table discussion with participant*	*The participants introduce themselves (health, experience, etc.), they described their expectations: some want to discuss the problem of bags of fruit, others are more vague*
(…)		
10:45 a.m.	*The trainer suggests a practical exercise on the rule of balance*	*The handlers are active, they participate fully. During the exercise, the handler with the most seniority (A), shows what to do when you find yourself on the ice (…)*

General comments on training

Adapting training to context

Overall level of adaptation of the training <u>content</u> to the context: 1 2 3 4 5 6 7 8 9 10

Overall level of adaptation of the training <u>format</u> to the context: 1 2 3 4 5 6 7 8 9 10

Prior preparation to adapt to the context: □ Yes   □ No

How: _____

Suggested exercises: _____

Critical eye of the observer

Overall performance of trainer/ease: 1 2 3 4 5 6 7 8 9 10

Overall level of difficulty for the trainer: 1 2 3 4 5 6 7 8 9 10

+++ What worked well: _____

--- What worked less well: _____

Other comments _____

APPENDIX 6:
LOGBOOK

The purpose of this logbook is to provide information about the training you give during the follow-up carried out by the research team. Its goal is to keep track of your training intervention and your pedagogical choices. We therefore ask you to be as exhaustive as possible in your answers. Append all documents that you deem useful or necessary to our understanding of training: a description of the mandate, training document, visual aids, etc. In the event that we track more than one of your training courses, you will need to complete one logbook per training course.

An interview with the research team will complete the content of your logbook to clarify the points that are more difficult to understand or to provide more detail.

1. The training context: the environment of the requesting party, the training participants and the mandate

1.1 This is an organization in the sector of:

1.2 The organization produces:

1.3 Is the organization is very small, small, medium-sized, large?

1.4 Indicate the approximate number of employees if known (distinction between floor vs. office workers if applicable):

1.5 Do you have information about the characteristics of the population of workers in this organization (age, seniority, health, etc.)?

1.6 What is your level of familiarity with this organization?

This is the first time that I have worked with this organization.

This is not the first time that I have worked with this organization, but I don't know it very well.

I know this organization very well/we have developed a good relationship over the past several years.

1.7 If you have previously worked with this organization, briefly describe the nature of the work.

1.8 In your opinion, what is the level of OHS maturity of this organization? Please explain.

This is an organization that operates mainly under duress or in a corrective/reactive mode:

This is an organization that is proactive about prevention:

1.9 What was your initial mandate?

1.10 Have you been able to make progress with this mandate/this request, YES/NO, explain how?

1.11 Did the training you provided deal with

      A portion of the overall work: certain objects/sites/tasks, etc.; which ones?

      All of the work?

1.12 Could you give us a brief description of the work done by workers who were trained?

1.13 Specifically regarding the group of trained workers, were there any particular characteristics compared to the general population described above (age, injuries, expertise, etc.)?

2. Training activity: pedagogical activities, duration and progress

2.1 Before the training period, did you conduct preliminary analyses, gather information (interviews, information about the organization, photos/videos, etc.)? Describe what you did.

2.2 How long did training last in total?

2.3 Did training take place all at once or was it divided up (e.g., two or three training sessions)?

2.4 Describe the training activities <u>you had planned;</u> present your planned chronological sequence, if possible (e.g., practical workshops in a classroom, theoretical presentations/lectures, practical workshops on workstations, etc.):

2.5 Describe the training activities <u>that actually took place</u>. Only identify what was modified:

2.6 Following the provision of training, did you conduct a follow-up? Please describe it.

3.The model presented in training: choice in terms of the approach recommended during the trainer training

3.1 What were your three main objectives for this training program?

1.   2.   3.

In your opinion, were they reached? Explain:

3.2 What are the elements presented during training on the *Integrated Prevention Strategy for Manual Handling (IPSMH)* that you selected and why (explain your choices according to context):

3.3 What are the elements that you would have liked to discuss and that you had to leave out? Explain:

3.4 What are the principles that you would like to concentrate on? Explain:

Postural alignment   Lever arm   Loading

Use of the load   Body balance/grip   Use of the body

Transition   Rhythm of movement

3.5 What are the concepts of the approach presented in training that you found the most difficult to put into practice (some principles that seemed more complex to illustrate, the format and the recommended duration of the training were difficult to negotiate, the fact that you had to modify your practice as a trainer to that of a mediator, etc.):

4. The participation of handlers and the host environment

4.1 To what extent do you feel you were supported by the host environment before, during and after training (favourable conditions, response to your requests, etc.)? Explain:

I feel I was not supported very well/I feel that I was sufficiently supported/I feel that I was supported very well.

4.2 In thinking about the trainees/handlers, I found them

Off–putting, they did not appear to understand the relevance of the approach.

Quite indifferent, in that they were not very receptive/quite passive; it was difficult to stimulate their interest/attention:

Quite proactive, I felt that they were interested in this approach

4.3 In your opinion, how was this approach perceived <u>by the organization</u>?

4.4 In your opinion, how was this approach perceived <u>by the trainees/the handlers</u>?

5. Indirect impacts of training

5.1 How do you rate the success of this training approach? Explain what it is that makes you think that way:

I have the impression that this approach did not work well, at least not as well as a traditional training approach.

I have the impression that this approach worked the same way as a traditional training approach.

I have the impression that this approach worked better than a traditional training approach.

5.2 Have you been able to act on anything other than training? If so, what (workstation transformations, reduction of OHS pressures, opening for other mandates/interventions, etc.)?

5.3 In your opinion, what are the main challenges for TPs who wish to use this approach to prevent handling risks?

5.4 What advantages do you see for TPs to use this training approach to reduce handling risks?

6. Reflective practice, improvement of my practice as a trainer

6.1 Considering your practice as a TP, what are the main elements that caused you problems during your training?

6.2 How did you overcome them?

6.3 in your opinion, what elements in the <u>context of the organization</u> have most influenced your training intervention? Could you identify the barriers and the facilitators?

Characteristics of the organization that constitute barriers:

Characteristics of the organization that constitute facilitators:

6.4 In your opinion, what elements <u>of your context/your employer</u> (if different than that asked in question 6.3) have most influenced your training intervention? Can you identify the barriers and the facilitators?

Characteristics of my employer/organization that constitute barriers:

Characteristics of my employer/organization that constitute facilitators:

6.5 The next time you run a training course, what would you do differently? Explain:

6.6 Which actions/elements of training did you think you would implement but were unable to? Explain:

6.7 Which are the elements that you are most proud of in this training program? Explain:

6.8 If you were to rate this training program, what would your overall level of satisfaction be?

Completely dissatisfied; Very dissatisfied; Dissatisfied; Not very satisfied; Satisfied; Very satisfied; Completely satisfied. Explain why:

7. General comments

7.1 if there is anything else that you feel is relevant and it was not dealt with anywhere else, please let us know.

APPENDIX 7:
POST-TRAINING INTERVIEW FRAMEWORK

The goal of this interview is to complete and/or validate the information obtained from the logbook and/or during observations carried out by the research team. It will provide information about the general conduct of the training that you have given on the Integrated Prevention Strategy for Manual Handling (IPSMH) in May and June 2015. The goal here is to explain and better understand your choices when you provide training and to better describe your activity as a trainer. The interview will last about one hour.

1. The training context, the requesting environment, the training participants and the mandate
1.1 Can you describe the mandate (origin, nature, etc.)? Have you reformulated or clarified it with the requesting party, and if so, in what way? Do you have a specific strategy to "sell" this new training product? What are your main arguments?
1.2 Describe the host environment (the organization), what are its characteristics (e.g., size, economic health, dependence on a group)? What is its sector of activity?
1.3 Do you know anything about this organization's experience in preventing handling risks (previous training, transformation of work situations, etc.)?
1.4 What is your level of familiarity with this organization (know it well vs. first intervention)?
1.5 How were the work situations or activities presented/discussed identified during the training? Describe the situations:
1.6 What is the level of variability in this organization (loads, tasks, seasonal work, etc.)?
1.7 What are the characteristics of the trained worker population (number, groups, experience, seniority, injury history, etc.)?

2. Training activity: pedagogical activities, duration and sequence
2.1 Describe and explain your pedagogical choices for this training.
2.2 What was the training process? What was the proportion of the practical vs. theoretical components?
2.3 What were your choices/decisions on the duration and format of the training (spread over time, reminders, follow-up, etc.?
2.4 Can you explain your choices of/intentions for the material presented during the training?

3. The model presented in training: choice in terms of the approach recommended during the training of trainers
3.1 What were your main objectives for this training program? Can you name three?
3.2 With respect to the action principles, which ones did you choose to present? Which ones did you choose to set aside? Explain your choices:
3.3 In terms of the approach presented during the training of trainers, what did you choose and what did you leave out? What were your reasons (context, time, etc.)?

4. The participation of handlers and the host environment
4.1 How did discussions with the handlers take place? How much did they cooperate/participate? What kinds of interaction and questions did they have? How would you rate their motivation?
4.2 How would you rate the support in the host environment (the organization)? Did you have access to workstations, rooms to practice? Were you able to organize mentorships or plan other activities?
4.3 In general, were you able to obtain which you asked for or did you have to make some compromises because you did not have all the conditions you wanted?

5. Indirect benefits of training: the IPSMH approach

5.1 Were you able to monitor the impacts of this training? If so, in what way (visits to the sites, meetings, etc.)?

5.2 What do you think is the scope of the training you provide? Is it only a more traditional handling training course or did you feel that you had a broader influence?

5.3 Have you noticed other impacts of training (transformation of work situations, interventions in other workstations, a reduction in OHS problems, a change in handlers' perception of their work or supervision, etc.)?

6. Reflective practice, improving my practice as a trainer

6.1 When you were giving the training, how would you rate your comfort level? Explain:

I felt very uncomfortable.   I felt somewhat uncomfortable.   I felt comfortable.
I felt very comfortable.

Explain:

6.2 What are the main difficulties you have encountered as a TP?

6.3 How did your work environment influence this training course? Do you think that there were barriers or facilitators? If so, explain:

6.4 What characteristics of the training context do you think most influenced your training intervention?

6.5 If you had to do it again, what do you think you could improve in the next training course?

6.6 In general, what worked best? What didn't work well?

7. General comments

7.1 What else would you like to add?

APPENDIX 8:
DEFINITION OF APPROPRIATION INDICATORS

1. Content indicators

	1	2	3	4
1.1 Action principle				
Theory	The principles are not illustrated.	The principles are illustrated and few links were made among them. With or without interpretation errors.	The principles are frequently illustrated. Several links are made among them, but sometimes some interpretation errors are noted.	The principles are frequently illustrated. Several links are made among them and are used/interpreted faithfully.
Practice	The principles are not illustrated.	The principles are illustrated and few links were made among them. With or without interpretation errors.	The principles are frequently illustrated. Several links are made among them, but sometimes some interpretation errors are noted.	The principles are frequently illustrated. Several links are made among them and are used/interpreted faithfully. They are used to provide feedback.
1.2 Actual work activity				
Theory	The actual work is not illustrated.	The actual work is not often illustrated.	The actual work is illustrated and discussed most of the time (e.g., transformations, difficulties experienced, solutions/strategies, tasks, know-how, determinants, work organization principles, etc.).	The actual work is illustrated and discussed (e.g., transformations, difficulties experienced, solutions/strategies, tasks, know-how, determinants, work organization principles, etc.) and is at the heart of the theoretical part.
Practice	The actual work is not illustrated or used for practical simulations.	The actual work is not often illustrated or used for practical simulations.	The actual work is illustrated, discussed and used most of the time for practical simulations (e.g., transformations, difficulties experienced, solutions/strategies, tasks, know-how, determinants, work organization principles, etc.).	The actual work is illustrated, discussed and used (e.g., transformations, difficulties experienced, solutions/strategies, tasks, know-how, determinants, work organization principles, etc.) and is at the heart of the practical part.

2. Means Indicators

	1	2	3	4
2.1 Participatory approaches				
Theory	The trainer acts as a <u>knowledge transmitter</u>.	The trainer acts as a <u>knowledge transmitter</u> (dominant approach) and sometimes as a <u>mediator</u>.	The trainer acts as a <u>mediator</u> (dominant approach) and sometimes as a <u>knowledge transmitter</u>. He/she encourages everyone to participate.	The trainer acts as a <u>mediator</u> and encourages exchanges and discussions among the participants. He/she encourages <u>everyone to participate</u>.
Practice	The trainer acts as a <u>knowledge transmitter</u>.	The trainer acts as a <u>knowledge transmitter</u> (dominant approach) and sometimes as a <u>mediator</u>.	The trainer acts as a <u>mediator</u> (dominant approach) and sometimes as a <u>knowledge transmitter</u>. He/she encourages everyone to participate.	The trainer acts as a <u>mediator</u> and encourages exchanges and discussions among the participants. He/she encourages <u>everyone to participate</u> and gives feedback.
2.2 Establishment of learning conditions				
Theory	<u>No analytical or motor workshop is used.</u>	The trainer uses <u>analytical or motor workshops</u> that put the learners into action.	<u>Three of these four elements are present:</u> - The situations presented are <u>adapted to the learners' level</u> (e.g., targeted tasks, adapted vocabulary, gradual increase in difficulty). - <u>Analytical</u> or <u>motor workshops</u>. - <u>Group size is adapted</u> to the type of session. - <u>Innovative tools</u> (e.g., to encourage participation).	The situations presented are <u>adapted to the learners' level</u> (e.g., targeted tasks, adapted vocabulary). <u>Gradual</u> increase in difficulty. The trainer uses <u>innovative tools</u> and <u>analytical</u> or <u>motor workshops</u> that put the learners into action. <u>Group size is adapted</u> to the type of session.
Practice	<u>At the workstation</u> or in an <u>environment simulating</u> the workstation, without adapting the level of difficulty for the learner.	<u>At the workstation</u> or in an <u>environment simulating</u> the workstation where experimental situations are <u>adapted to the learners' level</u> (e.g., targeted tasks, adaptation of production demands, etc.).	<u>Three of these four elements are present:</u> - Entirely at the workstation. - The situations presented are <u>adapted to the learners' level</u> (e.g., targeted tasks, adaptation to production demands, adapted vocabulary, gradual increase in difficulty). - <u>Group size</u>: 2 to 3. - <u>Innovative tools</u> (e.g., for feedback purposes).	<u>Entirely at the workstation</u> where the experimental situations are <u>adapted to the learners' level</u> (e.g., targeted tasks, adaptation to production demands, adapted vocabulary, etc.). Gradual increase in difficulty. The trainer uses <u>innovative tools</u> (e.g., for feedback purposes). Group size: 2 to 3 participants.

3. Contextualization Indicators

	1	2	3	4
3.1 Material — illustrations				
Theory	The theoretical part does <u>not include examples</u> of work activities (photos, videos, simulations, loads).	The theoretical part includes examples of <u>other work activities</u> (photos, videos, simulations, loads) or activities outside of work.	The theoretical part includes <u>some</u> examples of actual work activities (<u>photos, videos, simulations, actual loads</u>) and a few examples of <u>other work activities</u> or activities outside of work.	Examples of the actual work activity (<u>photos, videos, case studies, actual loads</u>) <u>largely dominate</u> the theoretical part.
Practice	Activation inspired by activities <u>outside of work</u> only.	Activation inspired by <u>other work activities</u> (e.g., loads not lifted by the workers).	Activation based on <u>simulations of actual work activity</u> where tasks are not executed in the normal course of production/service activities (e.g., off the production line).	Activation <u>in the actual work situation</u>, where tasks must be executed in the <u>normal course of production/service activities</u> (e.g., palletizing actual orders) while being adapted to promote learning.
3.2 Preliminary analyses				
Theory	<u>No preliminary analysis</u> of the work activity to develop the theoretical part.	Analysis of the work activity <u>without collecting material</u> (e.g., video, photos, accident statistics) or <u>partial analysis</u> (e.g., the important tasks are missing) to develop the theoretical part.	Analyses of the work activity to develop the theoretical part and <u>material collection</u> (e.g., video, photos, accident statistics). <u>Without identifying one or more emblematic tasks</u> to be integrated into the theoretical part.	Analyses to develop the theoretical part. <u>Data collection</u> (e.g., visits, interviews) and <u>identification of tasks</u> to present (e.g., emblematic tasks) and <u>material collection</u> (e.g., video, photos, accident statistics).
Practice	<u>No preliminary analysis</u> of the work activity to develop the theoretical part.	Analysis of the summary work activity (e.g., only interviews) and <u>identification of material</u> that will be used in the practical part.	Analyses of the work activity (e.g., visits, interviews) to develop the practical part with <u>identification of material</u> that will be used and under which <u>conditions</u>. <u>Without identifying one or more emblematic tasks</u> to be integrated into the practical part.	Analyses to develop the practical part (interviews and visit). <u>Data collection and identification of tasks</u> to present (e.g., emblematic tasks) and <u>identification of material</u> that will be used and under which <u>conditions</u>.

4. Retention Indicators

1	2	3	4
4.1 Transformations			
The TP did not make/discuss any transformation.	The TP discussed one or more of the organizational transformations or techniques.	The TP carried out one or more of the simple technical transformations only (e.g., purchase of a handling assistance device, cart, PPI, etc.).	The TP carried out one or more major transformations. For example, one or more organizational transformations (e.g., working hours, inventory management, work organization, etc.) or major technical transformations (e.g., layout, purchase of large-scale equipment, etc.).
4.2 Parallel activities			
The TP has not conducted other activities besides providing training.	The TP monitored training during and afterward.	The TP monitored training during and afterward and set up or involved a working group or a follow-up committee.	Involvement in or setting up of a monitoring committee or a working group, monitoring the intervention and involvement of a variety of internal actors trained in the approach (e.g., workers, supervisors, directors) at several points during the intervention.

1: Far from the new approach; 2: Some elements of the new approach have been used; 3: Use of the new approach; 4: Innovations introduced to the new approach

5. Duration indicators

1	2	3	4
5.1 Total duration			
0 to ½ day	> ½ to 1 day	> 1 to 2 days	> 2 days
5.2 Proportion of practice			
0% to 25%	> 25% to 50%	> 50% to 75%	> 75%

APPENDIX 9:
DEFINITION OF APPROPRIATION DETERMINANTS

Appropriation determinant	Information gathered[1]
Employer	Characteristics of the TP's employer that represent facilitators (e.g., margin of manoeuvre, support of co-workers, etc.) and constraints (e.g., work load, imposed training content, etc.) and the implementation of the IPSMH. Represents the secondary environment.
Organization	Characteristics of the organization where the TP carries out the intervention and that represent facilitators (e.g., support/involvement of internal actors, margin of manoeuvre, etc.) and constraints (e.g., costs, restrictions to gaining access to workstations, etc.) and the implementation of the IPSMH. Represents the primary environment.
Trainer-practitioner (TP)	Characteristics of the trainer-practitioner that could influence the intervention: position (e.g., ergonomist); seniority; familiarity with the IPSMH; TP pre-training; sense of self-efficacy; familiarity with the organization; work activity or approach (if mentioned by the TP).
Tasks and learners	Characteristics of the tasks and the learners that could influence the intervention: learners' handling experience (experienced or novices); other characteristics of learners (e.g., immigrants); tasks performed by the learners (e.g., preparing orders, assembly, etc.); importance of handling tasks in the work activity (related or central); difficulties related to the context (based on the type of load and the environment).

[1.] *Data collection tools used to gather information: logbooks, interviews, shift logs, TP post-training questionnaires.*

Appropriation determinant: tasks and learners — difficulties related to the context

Difficulties related to the context: assessment of the difficulty of handling tasks in terms of the context in which they are carried out.
   1. Load characteristics:
      Uniform: Little to no variability in the type of load (format, weight, etc.).
      Diverse: variable types of loads.
   2. Environmental characteristics:
      Closed: the tasks are always carried out in the same environment—mainly indoors—where few elements can influence the performance of tasks (e.g., in the warehouse)
      Open: the tasks are performed in a variety of environments, where numerous elements can influence their achievement (e.g., outdoors, delivery activities)

Then, the characteristics of the loads and the environment are combined to assess the difficulty related to the context (scale of 1 to 4):
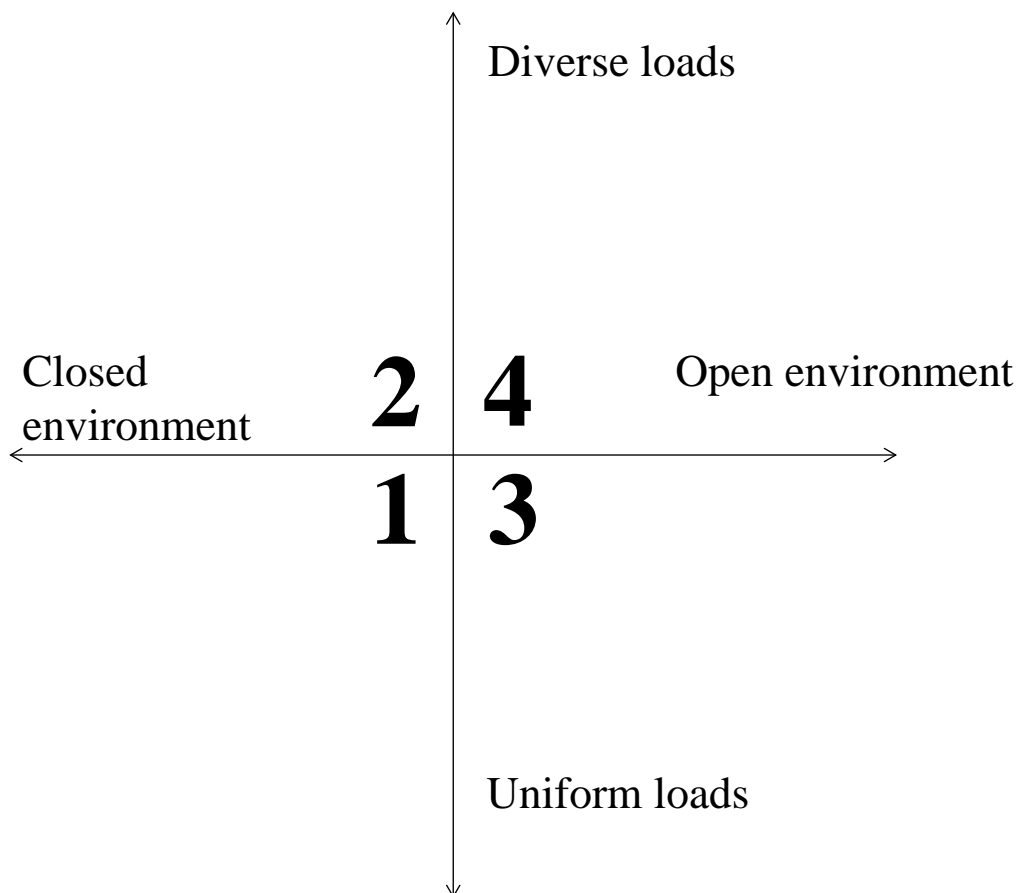
APPENDIX 10:
DESCRIPTION OF THE IPSMH'S NINE PRINCIPLES

Action principle	What does this principle refer to?
Postural alignment	This refers to the most appropriate postures for the back, especially for the lumbar region, when the greatest effort is generated. The timing between posture and effort is central. This rule stipulates that a spinal cord that is aligned is less exposed to stress.
Lever arm	This refers to the distance of the load from the body. Although a load has a fixed weight, the effort required to lift it could vary. In static position, a load that is far from the body increases strain on the lower back muscles and can have a disruptive effect on balance.
Loading	This refers to the time in which the load is carried entirely by the handler. The greatest effort often occurs when the load loses contact with the surface it was sitting on and is completely in the worker's hands: the longer one delays or shortens this moment, the less effort it takes.
Use of the load	This refers to the ability to take advantage of certain physical properties of the object being handled: shape, material, centre of gravity or position in space. It is best to "let the load work for you" instead of working against it. The concept of *moment* is central here.
Grip	This refers to control of the load by the grip that is used; in other words, the position of the hands on the object.
Body balance	This refers to the maintenance of the handler's stability and ability to react to unexpected events. This rule refers to the concept of control of the body.
Use of the body	This refers to the possibility of using the entire body to reduce the intensity of efforts to be made, particularly to combat the initial inertia of the object. The use of the body begins with the contribution of the lower limbs, the large muscle masses that perform most of the effort, for example, by transferring weight between supports.
Transition between pick up and deposit	Grasping an object requires stabilizing the overall posture of the body to support the grasping movement and to facilitate load control. Transition refers to the passage between this almost static position and the dynamic movement required it to transfer the object to where it will be deposited. An appropriate transition is made through the position of both the feet on the ground and the hands on the object to avoid twisting, for example.
Rhythm of the movement	This refers to the quality of the movement during the lifting and transfer of the load to when it is deposited. Two aspects should be considered in the concept of rhythm: the need to seek a regular and smooth movement, i.e., one that "flows," meaning *fluidity/regularity*, and the need to have an adapted *speed*.

APPENDIX 11:
EXIT INTERVIEW FRAMEWORK

The purpose of this interview is to review the elements and concepts presented during the TP training conducted in May and June 2015 and the difficulties encountered in applying the new approach (IPSMH) as a TP. In this way, it will be possible for us to explain and better understand the reality experienced in organizations and to better describe your activity as a TP. The expected duration of the interview is approximately one hour.

1. Explain the main reasons why, in your opinion, the IPSMH-based training was not provided?

2. Your practice and your work environment: following the training of trainer-practitioners (TPs) on the new approach to handling training given by D. Denis (June 2015)
2.1 Did you have to present/explain the new approach to your employer?
   2.1.1 If so, could you summarize **what you presented** (elements suggested, arguments, etc.)?
   2.1.2 If so, what were the **reactions** (restrictions, support, disagreement, etc.)?
2.2 Have you summarized/revised the concepts presented during the training received in June 2015? Have you reworked the material, made additions, etc. (e.g., rereading the TP workbook, searching for additional information)?
   2.2.1 If so, **for what purpose** did you carry out this summary/revision (e.g., preparation for arguments to present to organizations, organizing/planning the conduct of future training sessions)?
   2.2.2 Could you **describe the process** (e.g., time spent, documents used)?
   2.2.3 Could you describe the **elements/arguments** (pedagogical mechanism of the new approach, arguments used, etc.)?
   2.2.4 Could you identify any **benefits** from this exercise? What **difficulties** did you encounter?

3. Workplaces: requests received and mandates completed since June 2015
3.1 Have you received any requests for handling training?
   3.1.1 If so, of what **nature** (e.g., raising awareness, turnkey training, context-specific training)?
   3.1.2 Have you **reformulated or clarified** them with the requesting parties?
3.2 Did you try to convince an employer to include the new handling training approach in a mandate?
   3.2.1 If you tried to convince an employer to adopt the new approach, what were the **elements presented** to the organization (training characteristics—intervention)?
   3.2.2 What strategies and **arguments** did you use to convince the employer?
   3.2.3 What were the organization's **reactions** (arguments in favour and against, restrictions, support)?

4. Interventions carried out since June 2015

4.1 If you have carried out **handling** training or interventions (e.g., raising awareness, transformations in the work environment, purchase of equipment, etc.)

4.1.1 Could you describe the **approach** that was used (turnkey vs. adapted to context) and the **steps** taken (preliminary analyses, creation of a follow-up committee, etc.)?

4.1.2 Could you describe the content of the **training**, its format and the pedagogical methods used (e.g., subjects discussed, duration, number of sessions, time span, theory vs. practice, location, etc.)?

4.1.3 Could you describe the **transformations** related to material handling that you have carried out (e.g., refitting a workstation, purchasing equipment, reorganizing work, etc.)?

4.1.4 Have you **followed up** on your intervention to assess its impact (e.g., questionnaires, interviews, accident statistics, etc.)?

4.1.5 What is your perception of the **impact** that this training or transformations has had on workers' **receptivity** and on the organization's **perception** of how it should act?

4.2 Have you used the elements of the new approach in other interventions in organizations that did **not deal specifically with training** (e.g., observation and involvement of workers for transformations, use of a follow-up committee, use of action principles to analyze a work activity, etc.)?

5. New approach to handling training

5.1 What are the elements/concepts with which you are less comfortable?

Efforts (types, handling phases), **effects** (anatomy, injury mechanisms, lumbar loading, risk factor modulators), **determinants** (e.g., space available, distance, objects, performance demands), **action principles** (alignment, lever arm, balance, transition, grip, loading, use of the body, use of the load, rhythm), **organizational principles** (re-handling, margin of manoeuvre, rhythm, movement and trajectory, distribution of effort).

5.2 Overall, what were the three most difficult/complex elements you had to master in training?

5.3 What would you have changed/added/withdrawn in the TP training?

6. Other comments

APPENDIX 12:
EXAMPLE OF DATA USED TO CHARACTERIZE A CASE

a. **Context**

Organization: logistics (GE)

TP: operator-trainer

Mandate: training new employees and MSD prevention.

Objectives of training:
- Skills improvement;
- Integration of new employees.

General procedure
35 hours of training over five days
Observation (day 2):
- Demonstration of palletization and practice of trainees in the warehouse (actual working environment, normal production activities adapted to trainees).
- Review of the day in the classroom.
- Planned duration of observation: 8 hours, including 20 minutes of theory and breaks (7 hours of training).

Actors present/group during training
Two trainers (F1 and F2) and five trainees (new seasonal employees, students)
Practical part:
- F1: supervises two trainees (TP had received the training for trainers).
- F2: supervises three trainees.

Summary of observations

Figure: Shift log

Table: Summary of the shift log

Task	Total duration	Occurrence
Introduction	0:02 (0%)	1 (4%)
Explanation of concepts	0:08 (2%)	1 (4%)
Group facilitation/analysis	0:07 (2%)	1 (4%)
Practice/motor	5:25 (73%)	20 (74%)
Conclusion	0:07 (2%)	1 (4%)
Break/meal	1:34 (21%)	3 (11%)
Total	**7:23**	**27**

Table: References to the rules

Action principle	Number of references
Use of the load	34 (24%)
Lever arm	32 (23%)
Loading	26 (18%)
Alignment	16 (11%)
Transition	10 (7%)
Grip	8 (6%)
Use of the body	7 (5%)
Rhythm	6 (4%)
Balance	2 (1%)
Total	**141**

Interactions observed

    a. Adaptation of the training to the context

Overall level of adaptation of the <u>content</u> of the training to the context: 10/10.
Overall level of adaptation of the <u>format</u> of the training to the context: 10/10.
Prior preparation to adapt to the context: Yes.
Training document; on the work site; difficulty (production) adapted to the level of the trainees.

    b. Critical eye of the observer

Overall performance of the trainer/level of comfort: 9.5/10
Overall level of difficulty for the trainer: 8.5/10
Very comfortable, experience as a handler; good two-person team of trainers; context: variable loads.

b. Appropriation assessment

Appropriation indicators

1. Context		
	Theoretical part	**Practical part**
1.1 Action principles	**4**	**4**
	References: a total of 31 mentions (22-minute session); several for alignment (7), lever arm (4), use of the load (5) and rhythm (4); loading (2), balance (1), use of the body (2), grip (3) and transition (3) are also mentioned; few direct mentions, mainly references. **Links:** several links between the principles (alignment and lever arm; lever arm and use of the load; alignment and transition; balance and use of the body; use of the body and alignment; use of the load and rhythm; use of the load and grip; rhythm, alignment and transition) **Interpretation errors:** no error noted.	**References:** a total of 110 mentions (330 minute session); the principles are often mentioned and are used to provide feedback: use of the load (29), lever arm (28), alignment (9), loading (24), transition (7), grip (5), balance and use of the body (5); rhythm (2) and balance (1) are also mentioned. **Links:** several links between the principles (use of the body and lever arm; lever arm and alignment; use of the load and lever arm; use of the load and grip; use of the body and transition; transition and loading; grip and lever arm; use of the load and loading; lever arm and loading; lever arm, use of the load and alignment; use of the body and alignment). **Interpretation errors:** no error noted.
1.2 Actual work activity	**4**	**4**
	Actual work: very focused on energy conservation and efficiency; deals only with actual loads at work; strategies to gather information about the loads; strategies to use to avoid the risk of injury; environmental constraints (space) and strategies; strategies based on load characteristics (e.g., weight, format, fragility); grasping strategies according to load types; movement planning; avoiding re-handling; work pace; post-manoeuvres; risks of falls; margins of manoeuvre; safe method and compromises; strategies for the loading sequence; use of handling aids; use of voice picking and palletization strategies. **Other activity:** deals only with the actual activity. **Outside of work:** deals only with the actual activity.	**Actual work:** palletization strategies (e.g., flat surfaces and stability, placing the loads on the edge of the pallet, staggered loads); picking up/depositing distance; use of voice picking (information to mention, strategies to save time, etc.); environmental characteristics (row organization, aisle width, etc.); strategies and co-activity (communication, space and margins of manoeuvre, etc.); use of handling aids (pallet truck, in-house tool to approach loads); load characteristics (not very fragile, broken handles, weight, volumes, frequently handled loads, stability on the pallet, etc.); post- and pre-manœuvres; energy conservation, strategies for recurring problems (e.g., lack of loads for orders); time savings; quality requirements; handling planning; information gathering; accumulation of effort; fatigue; pallet packer use; available order information and palletization planning; interpersonal skills (thanking co-workers in the rows, etc.); palletization and compromises; strategies to solve common problems. **Other activity:** deals only with the actual activity. **Outside of work:** deals only with the actual activity.

	2. Mechanism	
	Theoretical part	**Practical part**
2.1 Participatory approach	**3** **Knowledge transmitter:** TP sometimes in the position of knowledge transmitter, because the participants are novices (without handling experience), but tries to share his handling experiences in the scope of the training. **Mediator:** TP encourages participants to share their experiences of the training day. **Participation:** the two trainers engage trainees; they target them to answer questions during the analysis workshop; they ask them if they have any questions, etc.; the TPs should give trainees more time to comment and reflect on the situations presented. Two trainers: good dynamics.	**4** **Knowledge transmitter:** TP acts as knowledge transmitter, because the participants are novices (without handling experience—new employees); adapted to trainees; TP mentioned that with older/more experienced workers, there is more discussion. **Mediator:** few exchanges among the participants; the trainer starts with the participants' operating methods to provide advice/recommendations/feedback. **Participation:** use of strategies to encourage trainees' motor engagement (e.g., short orders to alternate frequently); TP targets the trainees to ensure that everyone practices the same way. **Feedback:** very good and frequent feedback in real time; use of humour; the trainer takes advantage of the situations. The trainers give demonstrations.
2.2 Adjustment of learning conditions	**3** **Adapted to trainees:** review of what they did in the practical portion; the pace is a bit fast; vocabulary adapted to trainees. **Workshops**: analysis workshop: finding errors in the photos. **Group size:** five trainees. **Innovative tool:** none.	**4** **Location:** at the workstations (in the warehouse). **Adapted to trainees:** composition of groups according to the strengths and weaknesses of the trainees; production adapted to the trainees: gradual increase in the difficulty of orders (e.g., lighter loads, shorter orders) and gradual increase in trainees' autonomy; TP begins with demonstrations before having the trainees practice. **Group size:** five trainees for the first few minutes and then two groups (two and three trainees) good trainer/trainee ratio; groups are formed according to the strengths and weaknesses of the participants. **Innovative tool:** none. Normal trainer/trainee ratio: one trainer for two trainees

3. Contextualization		
	Theoretical part	**Practical part**
3.1 Material/ Illustrations	**4**	**4**
	Material used/actual work activity: the participants' document includes the analytical workshop using photos of the actual work activity (actual environment, actual loads and handling aids. **Material used/other activity:** none. **Material used/outside of work:** none.	**Material used/actual work activity:** only uses the loads handled in the actual work activity; uses handling aids and tools used in the actual activity (e.g., voice picking). **Material used/other activity:** none. **Material used/outside of work:** none. **Actual situation:** the trainees make real orders adapted to their level of learning. **Simulations actual work activity:** no. **Action/other activities:** no. **Action/outside of work:** no.
3.2 Preliminary analyses	**4**	**4**
	Data collection method: accrual of information through experience (the trainer is a handler). **Materiel/data collected:** photos of the actual context for the participants' document. **Identification of tasks to be integrated:** presentation of tasks performed in the practical part (these are planned and listed in the training program document). TP: a great deal of experience and knows the work activity very well.	**Data collection method:** by the work/experience. **Materiel/data collected:** N/A. **Identification of tasks to be integrated:** orders adapted to the trainees' level. **Identification of equipment to be used:** equipment used in the normal course of work (e.g., pallet truck, voice picking technology, pallets, etc.). **Identification of implementation conditions:** on the floor; choice of types of orders to be carried out; supervision adapted according to the participants progress (plan presented to the HSC).

	4. Duration
4.1 Total duration	**4**
	Total duration reported by the TP: 7 hrs./day over 5 days
4.2 Proportion of the practical part	**4**
	Total duration of the theoretical and practical parts reported by the TP: Theoretical part: 1 hr. 40 min. (5%) Practical part: 30 hr. (95%)

Appropriation determinants

Organization — Employer

Sector: <u>logistics</u>
<u>LE</u> (large company); total number of employees: 400 (warehouse: 300; office and other: 100).
Characteristics of employees who are handlers: from 18 to 65 years old; male; seniority from 0 to 40 years; mainly back, shoulder and ankle injuries; the employees spend on average 15 years in handling before having a permanent position as a forklift operator or other.
OHS maturity of the company according to the TP: mainly reactive.
OHS training already in place for several years; progression of the training by the TP.
Less effort on post-training follow-up and follow-up of experienced employees than on training of new workers (in progress).
Mandate: train new employees and prevent MSDs.
<u>Barriers:</u> duration of training limited by the volume of production demanded.
<u>Facilitators:</u> gradual progress in OSH culture (e.g., flexibility for new employees to adapt to the production level demanded); a lot of flexibility for trainers; good support from the company/employer.

Trainer-practitioner

<u>Operator-trainer</u>
Employed by the company for <u>11 years</u>
Trainer for the past five years
<u>Sense of self-efficacy</u>: 8.4/10
<u>Familiarity with the IPSMH</u>: 3/10
<u>Familiarity with the work activity</u>: several years of experience as a handler.
Negotiations to change the mandate: the TP has been trying for several years to change the vision of production to give more room for manoeuvre to new employees; presentation of the training program to the HSC.
TP received trainer training from an external company.
TP created a training document after the TP training course (IPSMH).

Learning context/tasks

<u>Tasks:</u> order preparation/pallet preparation (very varied sizes and weights of loads; double electric pallet truck; approximately 1200 loads handled per day; 9500 kg/day).
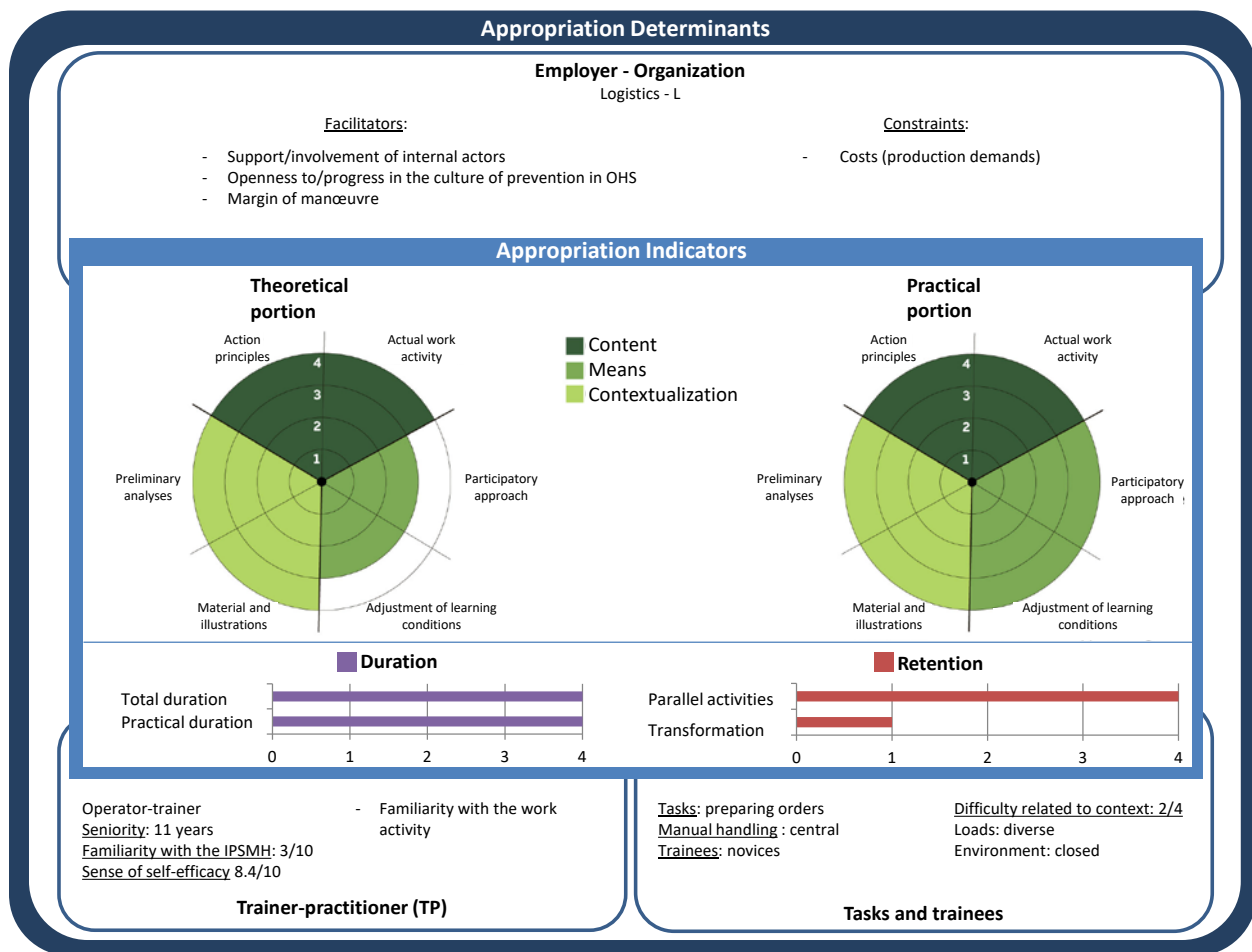<u>Trainees:</u> new employees without handling experience.
<u>Handling:</u> central activity.

Assessment of the difficulty of the learning context: 2/4
- Closed environment.
- Diverse loads.

Diagram of appropriation indicators and determinants

Appropriation Determinants

Employer - Organization
Logistics - L

Facilitators:

- Support/involvement of internal actors
- Openness to/progress in the culture of prevention in OHS
- Margin of manœuvre

Constraints:

- Costs (production demands)

Appropriation Indicators

Theoretical portion

Action principles
Actual work activity
Preliminary analyses
Participatory approach
Material and illustrations
Adjustment of learning conditions

■ Content
■ Means
■ Contextualization

Practical portion

Action principles
Actual work activity
Preliminary analyses
Participatory approach
Material and illustrations
Adjustment of learning conditions

■ **Duration**

Total duration
Practical duration

0   1   2   3   4

■ **Retention**

Parallel activities
Transformation

0   1   2   3   4

Operator-trainer
Seniority: 11 years
Familiarity with the IPSMH: 3/10
Sense of self-efficacy 8.4/10

- Familiarity with the work activity

Trainer-practitioner (TP)

Tasks: preparing orders
Manual handling : central
Trainees: novices

Difficulty related to context: 2/4
Loads: diverse
Environment: closed

Tasks and trainees

APPENDIX 13:
SUMMARY OF IMPROVEMENT AND MODIFICATION PROPOSALS
FOR THE IPSMH AND THE TRAINING OF TRAINERS

Proposed improvement	Proposed modification
To the IPSMH	
1: the various opportunities identified for the IPSMH should be promoted more in the training of trainers to encourage its broader dissemination in order to maximize its potential. The TPs must, however, be prepared to adapt the IPSMH to these other groups and contexts, in particular for the rehabilitation of injured workers.	Further develop other potential opportunities for the IPSMH to eventually present them as a train-the-trainer program.
2: in addition to the training of trainers, offering monitoring and feedback after the first use of the IPSMH would probably encourage its appropriation even more and could be an additional incentive to its use, especially for those with a lower sense of self-efficacy in post-training and/or those who are less familiar with the approach or with handling per se. The last two variables interfered with use of the IPSMH.	Add monitoring of the TPs, by other practitioners familiar and comfortable with the approach, when it is first used.
7: an alternative strategy of progressive implementation of the IPSMH could be suggested, instead of a single comprehensive model. This step-by-step training approach, for example, in two or three phases, would make it possible for TPs to negotiate training budgets that would be spread out over a longer period, enabling organizations to divide up the costs and to gradually amortize them. One possible disadvantage is that the intervention may be halted before the end of the entire process.	Study the impacts of alternative implementation of the IPSMH to eventually present them in the train-the-trainers program.
To the training of trainers	
3: the principles used less often by the TPs are the most abstract: it is not as easy to describe them. The use of new information technologies, in particular augmented reality and the use of animated avatars, could perhaps be considered to teach these principles. Sufficient time and emphasis on their importance has been devoted to these principles in training; the solution lies in how to make them more intelligible and tangible for TPs.	Develop tools and/or technological interfaces to present more abstract or complex concepts (in progress).
4: The emphasis in training TPs in use of the IPSMH has been on its specific content, in particular, the action principles, and have therefore taken up most of the training time, since they constitute its originality. The training method characteristic of the IPSMH (participatory and reflective approaches, motor engagement in adapted situations, identification of contextual constraints) should now take up a greater share of the TPs' training time. Following a rationale similar to that of the rules, the pedagogical principles specific to the IPSMH's action mechanisms could be offered to TPs to help them create conditions more conducive to learning.	Add a training activity on pedagogical principles during a fifth day of training.

5: the idea of seeking to change working conditions in order to reduce constraints was discussed in the training of trainers. However, it was the constraints that caused exposure to MSDs that were mainly addressed: weights of loads, daily tonnage, congestion, etc. The conditions that could lead to a higher transfer rate from trainees have not often been the subject of discussion: support from the team leader in using the new knowledge, temporary adjustment of return-to-work conditions to adapt them to the level of newly-trained employees, etc. These aspects should also be the subject of more sustained discussions with the TPs, especially since they feel that post-training transfer rates are low and gradually decrease over time.	Add a training activity on conditions that promote better transfer of new learning for handlers in their workplace during a fifth day of training.
6: as this study identified the principal appropriation determinants in the IPSMH, a relapse prevention workshop could be suggested in the scope of training of trainers to prepare the TPs to deal with it. Both the barriers to and the drivers of use of the IPSMH will be identified and adjustment strategies determined; they will take into account the multiple realities of TPs and their primary and secondary environments.	Add a training activity in the form of a relapse prevention workshop on barriers to use of the IPSMH during the fifth day of training.
8: some of the training of trainers concentrated on the particularities of handling as a work activity, which distinguishes it from other mainly manual vocational activities. This educational activity should be enriched by comparing handling with other typical OHS topics for which training is offered by TPs. This comparative exercise would focus on the distinctive aspects of handling in terms of learning, and on the pedagogical implications flowing from it, and could serve as a support in the negotiation of the mandate.	Enhance the second training activity (the particularities of handling), by adding elements on the particularities of handling as a training subject/topic.
9: a theoretical portion on the major educational currents for adults in an occupational context could be added to the training of trainers. Situating the IPSMH in relation to these various approaches would provide better understanding of its action mechanisms, the minimum conditions required for its implementation and the results it is likely to produce. Moreover, it is not impossible to believe that the content of the IPSMH (i.e., the rules), could be used in other pedagogical frameworks and with other means than those provided in the IPSMH. The action mechanisms must then be specified.	Add a training activity to present and discuss the pedagogical trends in adult education in the vocational context during a fifth day of training.
10: additional training in negotiation and "sales" should be considered, but adapted to promote prevention and OHS training activities, including handling. A better understanding of the needs and principal constraints of those requesting services appears useful to develop among TPs.	Enhance training activity 16 (the IPSMH and its dynamics), by adding elements on negotiation.