Abstract

The purpose of the paper is to explore individual and collective workplace learning in the contemporary industrial work. The research is based on two case studies in the Finnish packaging industry in which standardized observations and qualitative interviews have been carried out. The cases show that the socio-technical development has created learning conductive work at the individual level, but failed to create possibilities for collective learning. The still prevailing bureaucratic mentality prevents the employees from fully contributing to collective learning and work system development. The employees are able to learn at work, but they are not allowed to make the work system learn. In order to become organizations in which internal and external development may take place at individual and collective levels alike, the case organizations should directly address their shared mental models regulating employees’ participation opportunities rather than leave those models to develop in a non-reflected way. The focus of the workplace learning research should broaden from individual to collective learning. What supports workplace learning at individual level is already well-known, organizational hinders and supports for collective learning should be studied further. The paper contributes to the field of workplace learning by presenting a conceptual model on sustainable development building on concurrent individual and collective learning. With the help of this model, strengths and weakness in an organization’s approach to workplace learning can be detected.

Key words: workplace learning, collective learning, post-bureaucracy, sustainable development.
Introduction

The aim of the socio-technical systems thinking has been to create industrial work responding to employees’ psychological needs and thus supporting their learning and development (e.g. Thorsrud & Emery 1969). Socio-technical thinking has been very influential in Finland; practitioners and researchers dealing with working life development have in universities studied the socio-technical thinking as the basic approach for workplace improvements (e.g. Vartiainen 1994). But what kind of workplaces has socio-technical development created in Finland; to what degree is contemporary industrial work learning conductive? The aim of this paper is to discuss individual and collective learning in industrial work. With the help of two case studies, the possibilities of employees to learn individually and collectively in the Finnish packaging industry work are assessed and possibilities for further workplace learning are outlined. The research explores the interplay between work design and organizational design, organizational practices in supporting or hindering workplace learning, and the resulting learning opportunities in employees’ work.

The paper begins by defining conditions and consequences of individual and collective workplace learning; there are many theoretical approaches available for these issues and the aim in this paper is to create a unified conceptual approach to individual and collective learning by understanding them as interacting sub-processes in sustainable work system development. The research methodology and sample of the study are presented next. The case study findings are presented from the point of view of individual and collective development separately. The paper concludes by discussing the positive possibilities for individual learning in the contemporary industrial work apparent in the case studies as well as the lack of collective learning detected in them.

Workplace learning for the greater complexity in awareness and actions

Individual learning in a work system is supported by varied and rich work experiences: by possibilities to have new experiences and to integrate thoughts and feelings from those experiences to what has been learned before (e.g. Skule 2004, Wenger 2004, Illeris 2003, Barnett 1999, Karakowsky and McBey 1999). More precisely, work that is variable and complex, transparent and informing, participative and collaborative, challenging yet manageable, and also personally and socially rewarding has been defined as work supporting learning or individual development (e.g. Skule 2004, Wenger 2004, Ellström 2003, Billett 2001, Antonovsky 1987, Thorsrud & Emery 1969). In the socio-technical tradition, such work (coined as “good work”) has been sought through job enlargement and enrichment, and by granting a higher degree of autonomy to groups formed by production employees (e.g. Vartiainen 1994).

Workplace learning can be seen to support the development of both internal and external aspects of an individual (Illeris 2003, Karakowsky & McBey 1999). Continuous learning enables employees to gain a broader understanding on the object of their work and tasks needed to carry out work. Employees also learn more expedient ways to work both at the mental and manual level. The professional skills and competencies of an individual may grow. Furthermore, social interactions relating to learning conductive work may support the development of social competence. Besides of such development enabling more complex actions, workplace learning supports also internal development. Learning conductive work
enables employees to gain a more complex awareness of themselves as employees and persons: employees learn to know themselves better (cf. Allport 1964). Awareness of the work system that employees are a part of develops through workplace learning as well: an increasingly many-sided (empathetic and critic) understanding of the system may develop. Broader participation in the workplace activities also supports understanding the relativity of one-self and the system: one’s assumptions are not ultimate truths (Bohm 1996) and the system can be understood differently by others. Therefore, the complexity of an individual may increase through learning – her being and her repertoire of cognitive, affective, and physical responses to an environment become more complex. Potential for alternative internal and external actions increases (e.g. Lehesvirta 2004, Schoenfeld 1999).

Collective learning finds its starting point from an individual sharing the outcomes of her learning processes – her intuitions (Crossan et al. 1999). According to Nonaka (1994), at the group level intuitions of individuals are shared and elaborated through joint reflecting and doing. Emerging new knowledge is integrated to already existing group level knowledge and may result in new kinds of collective actions. Eventually, shared thinking patterns and practices may become institutionalized and form the articulated and unarticulated practices, processes, and structures of the work system, its values and norms. (Crossan et al. 1999)

Individual awareness has transcended into collective awareness. As in the case of an individual, the internal and external complexity of a collective may thus increase through workplace learning: the shared mental models (“internal”) may develop and the repertoire of organizations practices and structures (“external”) may become richer. At the collective level, greater complexity of awareness means more productive and humane culture, shared responsibility for collective outcomes in regard to different stakeholders (employees, owners, customers, and society) as well as flexibility in collective awareness – flexibility to change together when needed (e.g. Fischer 2003, Kira 2003, Pfeffer 1998). Collective learning also influences the way the members of the collective view power relations; whether top-down control prevails (i.e. bureaucracy) or whether the operations are more equalitarian allowing broader participation and influence from all the members of the collective (i.e. post-bureaucracy, see e.g. Kira 2003, Forslin 1996).

The holonic nature (Van Eijnatten 2004) – the simultaneous whole-part nature – of individual-collective workplace learning is evident. Different facets of an individual (cognition, emotions, physical skills) learn concurrently, and an individual learns as a part of a greater whole – as a participant and contributor to a work system. A group learns through the learning of its members and as a part of an organization, a society, a professional group. Therefore, individual and collective learning are interacting processes in which the holonic capacity (Van Eijnatten 2004, Fitzgerald & Van Eijnatten 1998) of individuals and groups is allowed to contribute to the mutual development towards greater complexity. Holonic capacity means an individual’s (or any system part’s) ability to operate with greater mindfulness and expanded awareness, and to influence future events. Holonic capacity also demonstrates itself in a willingness to advance to a higher level of complexity instead of clinging on to the status quo (Fitzgerald & Van Eijnatten 1998); in a willingness to learn and develop. An individual can thus be understood as a holon (as an independent entity being simultaneously a part of a greater whole) who, when sharing her insights and intuitions, exercises her holonic capacity to change herself and change also her environment. Collective learning is in this sense founded on the holonic capacity of individuals – their capacity to conceive the system they are a part of as well as to conceive ways to change the system and themselves towards higher levels of complexity.
At its best, workplace learning may thus mean the development of complexity in awareness and actions at both individual and collective levels with both individuals and collective contributing to the development by exercising their holonic capacity. This is illustrated in table 1. Such concurrent development of internal aspects (complexity of awareness) and external aspects (complexity of actions) simultaneously both in individuals and the systems they form can be defined as sustainable development (see e.g. Backström, et al. 2002): development in which no-one develops at the expense of the others, but in which the development of one contributes to the development of all. Therefore, in the paper, the aim is to explore the possibilities for sustainable development through individual and collective learning in contemporary industrial work.

Table I. Sustainable development – The simultaneous development of internal and external aspects of individuals and collectives.

TAKE IN TABLE I.

**The methods and sample**

The empirical data for the research have been gathered in two case study companies operating in the packaging industry – in a company producing paper based packages and in a company producing flexible packages (of paper, plastic, and metal) for mainly food industry. The packaging industry is characterized by traditional production methods as well as intensifying and diverging customer demands. The degree of IT implementation in the production work is also increasing as production machines are to an increasing extent controlled and monitored via computers. Therefore, the packaging industry offers an interesting case of industrial work in transition from automated mass production to more customer-oriented and informated work (cf. Zuboff 1988).

Forty-five employees working in five plants of the two case companies were interviewed and their work was observed (interview-observations lasted from 1.5 hours to 4 hours). The employees interviewed and observed work as machine operators on material manufacturing, die-cutting, extrusion-laminating, flexoprinting, rotogravure printing, and offsetprinting machines. On each machine type three or four machine operators were interviewed and observed and this interview/observation data were analyzed as one group in order to create a comprehensive picture on the learning opportunities on the machine type in question. In the observations, a standardized observation schedule (Frieling et al. 2005) was used to assess the variability, complexity, and independence of work, the collaboration and participation opportunities available, as well as feedback and information received by the employees relating to their work (“learning dimensions”). According to the socio-technical thinking, these characteristics of work and organization support workplace learning (see above). The interviews were carried out away from the production machine. The same issues as in the observations were covered, additional issues such as material and immaterial rewards for learning granted by the organization as well as interviewees’ development ideas relating to work and the operation of the plant were included to the interviews. Handwritten notes were taken during the interviews and observations, and the standardized observation schedule was filled in. Also altogether eleven representatives of the general and production management were interviewed in the two companies relating to their views on workplace learning.
The observation data were analyzed quantitatively: mean values for different learning dimensions were calculated at the company level in order to gain a rough estimate on the learning opportunities [1]. Interview data were analyzed qualitatively. The management interviews were analyzed as one group for each company. The employee interview notes for each machine type studied were grouped based on the emerging major themes. In the next step, emerging sub-themes within the major themes were recognized. In the following step, the “red threads” traveling through the themes and sub-themes were recognized. A report (containing a description on major and sub-themes distinguished as well as an elaborated discussion the “red threads”) was written for each machine type studied. In the last phase, the major issues crossing through all the machines studied in a company were recognized. The machine-wise reports as well as a concluding report containing the overarching issues for the company as whole were submitted for review and commenting to the companies. Feedback sessions to which all the managers and employees of the participating companies were invited were arranged. Any comments from the companies’ employees and managers at this point were included to the research data. Therefore, the validity of research was aimed to be secured through the triangulation of various data sources (employee and management interviews as well as observations) and through validating the research outcomes with the informants (whose learning processes were, after all, studied) (Golafshani 2003, Cresswell & Miller 2000)

**Individual learning at the workplace: Reaping the benefits from the sociotechnical era**

In both companies studied, the employees working on a production machine in the same shift form a shift group. Each shift group is responsible for carrying out the customer orders according to the production schedule (e.g. printing and/or die-cutting certain amount of packaging material based on a customer’s order). The shift groups plan how they carry out the orders, they set up their machines, carry out the production runs, and supervise the product quality. In the paper-based packaging company, the employees are responsible for quality: they decide when to move from set up to production and have the responsibility for responding to customer complaints. In the flexible packaging company, the first-line management personally supervises the move from set up to production (when it comes to the printing machines) and responds to reclamations. Therefore, the authority boundary between the management and the employees (Hirschhorn & Gilmore 1993) is defined differently in these companies when it comes to quality issues. However, in both companies the employees actively follow the product quality during the production and adjust the machine if needed.

In both companies, the shift groups may quite autonomously decide how they carry out the daily work. As an employee puts it, “Decisions can be made at work”. For instance, the shift groups may develop and implement new working methods; the interviewees note that details of work are done differently in different shift groups working on the same machine. Even though division of work follows position labels (e.g. machine operator, assistant machine operator etc.), the employees often master tasks beyond their position and division of labor ends up being situation dependent. “The division of work is living”, the interviewees explain it; the employees decide who does what and when, and very often no verbal agreements are needed. Each employee simply takes up a task that needs to be done.
In both companies the aim has been to broaden the task mastery of employees, so that they master all the tasks on their machines: according to the management interviews, the need for increased flexibility and customer responsiveness have been the motors of this development, the socio-technical aim of creating work responding to an individual’s needs and securing the retention of qualified employees has also been a factor in this. Such multiskilling has, however, changed the whole task dynamics – in various degrees the traditional position divisions are vanishing in the shift groups studied, collaboration has increased, and the work area of a single employee has extended from mastering a certain position to mastering many or all of the tasks on a production machine as well as carrying them out regularly. From the point of view of machine operators this means that sometimes they too carry out more simple tasks. Some machine operators interviewed do not mind this as the more simple tasks give them a break from more complex ones and as doing also more simple tasks helps them to keep up the comprehensive mastery of the machine. Some machine operators instead still prefer to keep the most complex tasks to themselves and task rotation takes only place when these machine operators are absent. Both companies allow also this to happen; the principle is that a shift group may decide for itself how tasks are carried out.

The shift groups are responsible for diagnosing any appearing quality or technical problems. In some cases they fix the problem themselves and, when a more complex problem emerges, they decide whom they contact to sort out the problem (first-line managers or maintenance employees). All in all, the communication flows freely in both companies; rather than routing information via the management hierarchy, the employees are encouraged to contact others within their plant, the best they see fit. In the paper-based packaging company, a production manager talks about “natural collaboration” between all employees and managers as the aim.

The shift groups are, thus, autonomous when it comes to carrying out the daily work. In some cases, the shift groups can also influence certain framework conditions of the production processes. For instance, to reduce set-up times, they may suggest changes to the production schedule (originally done in the production planning department) and thus influence the sequence in which customer orders are carried out. In one plant of the paper-based packaging company, the employees may even move customer orders between corresponding machines to make production run smoothly. In the paper-based packaging company, employees have also had chances to participate in the acquisition of new machine parts (employees have met with several suppliers and the purchase has been done based on their recommendation) and in the flexible packaging company they are actively developing new tools or making technical improvements on their machines. However, in both companies the participation opportunities in designing such framework conditions (the production planning, the characteristics and shape of the machine) are not as uniformly granted as the participation opportunities in the daily work are. As a counter weight to the positive examples above, the interviewees describe situations where they have not been able to influence production planning (the sequence in which customer orders are processed or the way raw material is processed on their machine) and where the development suggestions they have made have not been heeded to by the management. In these situations the employees have not been able to influence the ways the production processes are carried out and influence their further development. This can be understood as a break-down in a collective learning cycle: an intuition of an employee has not been allowed to become a seed for collective learning. Such situations have created malcontent among the employees; they have experienced that their expertise has not been appreciated and due to unresponsiveness from the management side, suboptimal work practices and processes have been maintained.
Nevertheless, it can be said that the work and organizational design in both case companies is following the socio-technical tradition (e.g. Thorsrud & Emery 1969): job enlargement and enrichment has broadened the task scope of the employees, the increased group level autonomy has extended possibilities to influence one’s work and perceive it as a meaningful whole. Walking through the socio-technical development path has created cyclically whole work – i.e. work progressing from planning the work via carrying it out to evaluating the outcomes. Work is also hierarchically whole as it demands the use of different level skills (cognitive, affective, social, and motoric). According to the socio-technical thinking (Vartiainen 1994, Thorsrud & Emery 1969), such work supports individual learning and development at the workplace.

**Collective learning: Unemphasized and accidental**

Work supports also collective learning to some extent – while working, the employees of a shift group are able to exchange ideas, elaborate them, and create new working methods or technical innovations as well as try them out. There are three issues that delimit, however, such collective learning. First, production technology applied in both companies (and in the packaging sector in general) is mature: production machines may be several decades old. Work routines have become quite established and the employees often find it difficult to see alternatives for the traditional ways to work. Even when the organization would give room for creativity, the employees are not able to utilize this room. Nevertheless, new products (e.g. new printing patterns and new product shapes) turn up and the interviewees tell how customer demands are getting tougher. That is why also new learning situations emerge from time to time. Second hinder for collective learning at work relates to hurry: daily work is often quite hectic. As noted above, the employees are responsible for all the aspects of the production work on their machines. Furthermore, the customer orders are quite short and the cycle of planning, setting up, and carrying out an order turns around rapidly. The exchange of ideas and learning together is therefore often limited by the speed of daily work; there is no time for longer discussions. Third, during the daily work, only employees working in the same shift may communicate. Learning together with other shift groups does not take place.

As the employees work autonomously to carry out their work, it would seem important that they also would have opportunities for discussing issues currently relevant in their work between themselves as well as together with closest supervisors and e.g. production planning department. Meetings focusing on work experiences and the small innovations made in different shift groups might support in questioning the traditions and finding new ways to carry out work tasks, as would inviting to these meetings different actors from in- and outside of the plant as well. However, in both companies, such discussion opportunities are provided irregularly or not at all. In the paper-based packaging company, there is an aim to arrange regular meetings for employees working on a certain production machine. Due to vacations and production pressures, these meetings are nevertheless arranged quite irregularly. And even when meetings are arranged, they often fail to provide venues for employee driven and work focused discussions. Instead the meetings are management driven, containing top-down information on the general situation of the company, the interviewees tell. The employees experience that meetings do not focus on relevant issues from the point of view of their work. In the flexible packaging company, regular meetings for employees working on the same
machine are not arranged and, also here, the irregularly arranged meetings are focusing only on issues chosen for discussion by the management.

In both case companies, even though the employees have gained high autonomy in daily work, the organizational practices have not developed to correspond to this situation. There are no venues for the employees to share intuitions and to elaborate them together into new shared practices and knowledge. Furthermore, development initiatives of employees are not always heeded to (as explained in chapter above) and also here, possibilities for individual learning to rise on the collective level are missed.

The employees themselves do, in any case, indicate the importance of collective learning in their work. For instance, in the flexible packaging company, the employees make sure that in shift changes outgoing and incoming shift overlap: this way employees from different shifts have an opportunity to communicate with each other. The employer does not pay any extra for the overtime accumulating from the overlapping shift changes. In both companies, many interviewees also state that meetings for the employees working on the same machine would be important and the meetings should concentrate on work relevant issues.

**Discussion: Exercising holonic capacity for collective learning**

Industrial work, as designed in the case companies, offers possibilities for individual development and learning: the employees have as rich and varied jobs as standardized production technology enables them to have, there are no organizational rules or boundaries that prevent the employees from experiencing and experimenting new things in their daily work. The complexity of actions, skills and competences, may grow. This type of work also supports the development of internal aspects of individuals as they are able to create a more complex understanding of themselves as members of a work system. Furthermore, acting as members of autonomous groups supports the employees in understanding the whole production process and their own contribution to it. In this sense, the socio-technical thinking has penetrated the industrial work settings studied: through job enlargement and enrichment as well as through increased autonomy the employees have gained broader learning opportunities.

However, collective learning is not equally supported in the case companies; it takes place in more accidental and unsupported manner. One could thus say that the employees have opportunities to learn within the work system, but they have no opportunities to make the work system learn. Collective learning, reaching both internal and external aspects of the work system, is prevented by broken cycles from individual learning to collective learning as venues for sharing insights and jointly interpreting them are not available and as the lack of response from the management prevents development initiatives from becoming a part of the shared knowledge base of the work system.

When an individual shares her intuition with others and thus feeds a collective learning cycle, she exercises her holonic capacity – her ability to function as a responsible and aware contributor to the development of the greater whole she is a part of. Sharing what one has learned means exercising holonic capacity also because an individual, when sharing her intuition, is prepared to change and develop along with the whole system. In the case
companies, the possibility of the employees to exercise their holonic capacity is obviously limited.

In a sense then, in the case companies, there exists only a vision of individual learning as a path towards the satisfaction and well-being of the employees and towards business success. The vision of sustainable development – the concurrent development of interior and exterior aspects of both individuals and the collective – is missing. One contributing factor to such one-sided vision is the still prevailing bureaucratic mentality (e.g. Kira 2003, Heckscher 1994) in these organizations. The autonomy in the employees’ daily work has extended, because that makes sense from the business point of view as well – autonomous and multiskilled employees can act fast and flexibly at the face of rapid and changing production requirements. However, giving the employees a chance to influence collective learning would mean that they would enter an area usually reserved for the management – the area of overall work system development. Such change has not emerged as a by-product of socio-technical production improvements propelled by competitive pressures, but would require new way of thinking from both the management and employees – thinking relying on more post-bureaucratic mentality (Kira 2003) emphasizing broader approach to participation and collective learning. Therefore, the sociotechnical development has not truly changed the interior aspects of the organizations studied (see also Van Eijnatten 2004), the principles of autonomy and participation are still constrained by the bureaucratic way of thinking. In a way, one can see a vicious circle at work here, see figure 1: as the interior aspects of the case organizations have not changed (e.g. the view on the way the employees are able to influence the work system development and contribute to collective learning), collective learning is hampered. As collective learning is hampered, the interior aspects of the organizations remain unchanged: movement away from bureaucratic collective mentality does not happen. And, due to such mentality, individual employees are not able to contribute to the collective learning, and collective learning is prevented.

Figure 1. The vicious circle of missed opportunities for collective learning.

Therefore, in order to develop further, to become organizations in which internal and external development may take place at individual and collective levels alike, the case organizations should directly address their shared mental models, the interior aspects of the collective, rather than leave those models to develop accidentally and in an unreflected way. A conscious choice should be made between being a socio-technically or sustainably developing work system, between being a work system focusing only on individual learning or allowing also collective learning building on individual learning to take place. By granting employees the right to contribute to the collective learning – by granting them the right to exercise their holonic capacity – further development in working conditions and production outcomes could be achieved in both case companies.

Endnotes

[1] In the research, the company level learning dimension mean values were compared to the learning dimension mean values for the corresponding German companies. The comparisons served as rough benchmarks on the level of learning opportunities in the Finnish case companies. In this paper the results from the comparisons are not presented, but focus is put on more qualitative findings in the case companies.
References

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FIGURE I.

Bureaucratic mentality: work system development is the right of the management.

Shared mental models are not questioned.

Individual learning is not allowed to feed collective learning

Opportunities for collective learning are missed.