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Self-Directed Learning in Creative Activity: An Ethnographic Study in Technology-Based Work

Abstract

Under conditions of rapid changes in working life, there is an urgent need to examine the nature of creativity and learning in organisations. The aim of this study is to investigate the nature of self-directed learning (SDL) practices in creative activity in technology-based work. We focus on both individual and collective practices but also on the importance of organizational culture. The data consist of 46 interviews and observational field notes collected from participating organizations. Thematic and ethnographic analysis were utilized as tools to reveal the nature of SDL in creative activity. We found three themes describing of the nature of SDL in creative activity: a combination of individual and collective action, solving common problems through dialogue and discussions, and the organizational culture framing SDL in creative activity. Based on the findings, we provided support for that SDL in creative activity is manifested as a sociocultural phenomenon and SDL practices are intertwined with creative activity. We discovered organization cultural frames that can support the realization of SDL and creative activity in working life. However, more research on the relationship between these phenomena and the conditions for their realization is needed.

Keywords: self-directed learning, creative activity, technology organization, ethnography

Introduction

Researching creativity in changing contemporary work is vitally important. The role of creativity and learning has been found to be crucial for long-term economic growth in the current global environment, which is characterized by rapid changes in technology and economics (Oddane, 2014). Creativity is one of the most important advantages for responding to the challenges produced by these changes (Florida & Goodnight, 2005). In technology-based organizations, work usually involves continuous problem solving (Collin, 2006; Havnes & Smeby, 2014; Nerland, 2008; Ha, 2015) and can thus be interpreted as constant creative activity (Collin et al., 2017). Research has shown that there is a link between creativity and learning (Beghetto, 2016; Gadjia, Beghetto, & Karwowski, 2017). In particular, self-directed learning (SDL) practices, where individuals and groups take responsibility for learning (Knowles, 1975), has been found to have a positive relationship with creativity (Edmondson, Boyer, & Artis, 2012; Cox, 2002) because problem-based contexts support the progress of SDL (Hmelo & Lin, 2000).

Both creativity and SDL have been approached mainly as individual-driven phenomena, but they have recently also been examined from sociocultural perspectives (see Glaveanu, 2015, 2018; Candy, 1991; Brockett & Hiemstra, 1991). In the context of work, creativity has been described as solving problems through activities that often depend on teamwork and collaboration (Collin et al., 2017; Ness & Soreide, 2014) and, which are enabled by organizational cultures or practices (Martins & Terblanche, 2003). When individuals are increasingly expected to take responsibility for their own learning at work (Ellinger, 2004), the practice of SDL seems to be one of the prerequisite for creative activity (Lemmetty & Collin, 2019). However, more research is needed on the relationship between creativity and learning (Anderson, Potocnik, & Zhou, 2014) and the nature of creativity and SDL (Cox, 2002) at work. In this study, we consider the nature of the phenomenon of *SDL*

practices in creative activity in the context of technology work. Participating organizations were drawn from the information technology, electrical engineering, and automation industries in Finland.

Researching creativity and SDL has been found to be challenging. Said-Metwaly, Kyndt, and den Noortgate (2017) observed that creativity has mainly been studied with the help of quantitative instruments, which have many shortcomings; for example, some of the instruments concentrate on individual-level creativity, leaving the environment, the occupational field, and the context disregarded (see also Amabile, 2017). Thus, more micro-level, ethnographic research on creative processes and behavior is needed (Ness & Soreide, 2014). In this study, we aim to fill the conceptual and methodological gaps by concentrating on the nature of SDL practices in creative activity, also taking into account the cultural aspects in a technology organization. We do this by utilizing an ethnographic research approach.

The Phenomenon of “Self-Directed Learning Practices in Creative Activity” in the Technology Field

From creativity to creative activity at work

In the context of work, the concept of creativity is complex and difficult to define (Amabile, 2017; Glaveanu, 2015, 2018; Littleton, Taylor, & Eteläpelto, 2012). However, there is agreement that creativity is combined with novelty or a new way to approach a problem (Sawyer, 2004). In addition, creativity is associated with the idea of usefulness (Gruys, Munshi, & Dewett, 2011). Creativity can also occur as a creative process (e.g., Amabile, 1996) or as any process in which participants act creatively (Drazin, Glynn, & Kazanjian 1999). In working life, creativity is connected to dealing with work tasks and

flexibility (Littleton et al., 2012), which are important for knowledge-intensive (e.g., technology-based) work (Ulrich & Mengiste, 2014).

Creativity has mainly been defined from an *individual* perspective (Amabile, 2017) and viewed as the generation of individuals' thoughts and ideas (Sawyer, 2004; Lubart, 2001; Mumford, Medeiros, & Partlow, 2012). For example, Amabile (1996) showed that the creative (idea generation) process progresses from identifying the problem to finding information, creating an idea, and finally evaluating it. Especially in the context of work, this kind of individual creativity is often linked to innovation processes (Bammens, 2016; Yuan & Woodman, 2010), where creativity manifests as thoughts and ideas that are important only at the beginning of the process (Bammens, 2016). Another prevailing approach to creativity is based on a *sociocognitive* framework, according to which creativity begins in the individual mind, and the social aspect of creativity is its manifestation (Oddane, 2014).

Seeing creativity only as an individual or sociocognitive process, it appears unchanged and undeveloped (Glăveanu, 2011). Therefore, creativity should be approached in accordance with *sociocultural* perspective, whereby it is a social process generated by the interactions between people. From this perspective creativity seem to be a developing and collective phenomenon (Glăveanu, 2011; Csikzentmihályi, 1996), which is also influenced by the organization operational and organizational culture. For example, employees' possibilities to have an influence on their work (Collin et al., 2017), and the affordances offered them (Glaveanu, 2015), are related to creativity. In investigating creativity as a sociocultural phenomenon in organizations, researchers have been increasingly interested in various manifestations of creative activity and processes (Forsman, 2018; Craft, 2008) in which the importance of interaction and other practices are obvious (Martins & Terblanche, 2003; Ness & Soreide, 2014). Nemiro (2002) discovered that the creative process of virtual teams is a comprehensive team action, which progresses through idea creation, development, and

finalization as well as closure stages of the evaluation phase. In the technology field, creativity is perceived as creating something new, developing work methods, and solving problems—individually or collectively (Collin et al., 2017). Problem-solving situations at work progress through different acts (Newell & Simon, 1972) in which creativity itself manifests as a practice-based process (Collin et al., 2017). Thus, the process of creative action is not only an individual mental idea formation, but, according to Glaveanu (2015, p. 167), it “necessarily engages self–other, symbolic–material, and past–present–future relations that turn it into a social, embodied, and temporal act.” Although creativity is increasingly seen as a sociocultural process and activity, there is still a need to examine the practices included in the creative activity process as well as the organization’s cultural aspects, within which creative activity manifest. As cultural aspects of organisations, Schein (1990) has been described the climate, the leadership practices, the physical environment and tools. Additionally, the importance of learning (Gajda et al., 2017; Beghetto, 2016) as well as the practices of SDL (Loyens, Magda, & Rikers, 2008) in creative activity has been highlighted, which is why we assume creative activity to be a phenomenon that includes SDL practices.

Self-directed learning: Process and practices

The tradition of SDL research is derived from the field of adult education. From the beginning, self-directedness has been described as a feature of adults that are intended to be self-directed (Lindeman, 1926) and, for example, are more motivated by internal rather than external factors (Knowles, 1975). In addition to SDL being described as an individual’s ability or attribute (e.g., Guglielmino, 2008), there are also several process descriptions in which SDL is manifested as the responsibility of the individual or group at different stages of the learning process. These studies of the SDL process have examined how an individual or group actually works in a self-directed manner in learning and what kind of SDL practices

this process involves (Tough, 1971; Knowles, 1975; Merriam & Caffarella, 1999). The first process descriptions were very linear and ignored the effect of the context (e.g., Knowles, 1975), while later-developed models also took into account the environment, the nature of the SDL, the strategies used, and the external elements of the process (Merriam, 2001). SDL is described as a process aimed at achieving set goals through different stages (Zimmerman, 2008), including planning, monitoring, managing, and reflecting on learning (Pintrich, 2004). According to Brockett and Hiemstra (1991), the stages of SDL involve the following different practices: a) *learners evaluate and set their learning needs*, (b) *they seek out the right learning resources and lead the planned learning activities*, and (c) *they evaluate the results of their learning*.

The concept of SDL has been criticized for giving an impression of learning as an individual and unsupported phenomenon, though in reality SDL can also be collective in nature (Candy, 1991; Loyens et al., 2008). Self-directedness in learning situations may refer to the responsibility of a team or other group, rather than an individual (Moe, Dingsoyr, & Dypa, 2008). The concept of SDL is also associated with a sociocultural approach. According to this approach, the formation of learning is the result of interaction with others and the environment (Vygotsky, 1978). Despite the learner's responsibility for his/her own learning being emphasized in SDL, it does not exclude the importance of context and culture for learning (Candy, 1991; Brockett & Hiemstra, 1991). On the contrary—how a self-directed learner can contribute to the process depends on the possibilities that the environment offers for this purpose (Candy, 1991). The cultures or practices that are linked to SDL in a work context include, for example, an inclusive leadership style, an experimental and error-tolerant atmosphere, employee autonomy and leaders' trust to their employees (Foucher, 1995), and opportunities for collaboration (Baskett, 1993). In addition, supportive but challenging organizational frameworks, open communication, sufficient time for learning (Kops, 1997),

orientation, support and guidance (Candy, 1991) enable SDL. In the current study, we approach SDL as learning practices that an individual or a group are responsible for as well as the practices that are influenced by external (organizational) frames.

Why it is important to study SDL practices in creative activity in the technology field?

In the technology field, digitalization provides new technology for the use of employees, but technology requires rapid learning (Harteis, 2017). Consequently, SDL practices seem to match these demands (Edwards, 2010; Ha, 2015). There are also changes in the ways that organizations operate and construct their cultures (Lee & Edmondson, 2017; Holbeche, 2015). In organizations, power has been increasingly transferred from the organizations to individual teams and employees (Rigby & Ryan, 2018) because self-directedness has been seen important in promoting both learning and creativity at work (Gijbels, Raemdonk, Vervecken, & van Herck, 2012). Self-directedness seemed to have become a goal and aspiration in organizations, especially in technology organizations, and is being implemented particularly by lessening hierarchies and creating autonomous teams. A self-directed team structure gives individuals and groups the power to make decisions about small problems (Moe et al., 2008), and this is considered to be an important principle in promoting creativity. At the same time, external control is seen to have a negative impact on creativity (Banks, 2010). These kinds of “self-directed” (Lee & Edmondson, 2017) or “agile” organizations differ from traditional ones, for example, in terms of their low organizational hierarchy and readiness for change: the changes are responded to flexibly and quickly (Nerur & Balijepally, 2007). There seems to be an ongoing trend in Finland where the idealization of an organizational culture based on self-direction and employee autonomy has increased. Many Finnish technology and knowledge-intensive organizations have lowered their hierarchy levels with the aim of increasing innovation and creativity and fast and agile

operations. However, the problem with such structural changes in organizations is that the true significance of the hierarchy level for creativity has not been studied, or the results of increased creativity and learning, especially in “agile” organizations, are not based on empirical research (Lee & Edmondson, 2017).

Summary of the starting points of the study

Based on earlier research, creativity and learning contain similar elements, they are often connected, and they support each other (Beghetto, 2016). Creativity has been often viewed as problem solving (Amabile, 1996; Collin et al., 2017), emerging in technology organizations in which the work itself is mostly problem-based (Collin, 2006; Havnes & Smeby, 2014; Nerland, 2008). In such creative work, the practices of SDL have been seen essential (Loyens et al., 2008; Hmelo & Lin, 2000), especially in low-hierarchy organizations, in which responsibility of work is shifting for the employees.

In this study, creative activity is defined as a practical problem-solving process (cf. Collin et al., 2017) proceeding from an examination of the problem to the actual resolution and evaluation stages (cf. Amabile, 1996; Nemiro, 2002). Creative activity seem to contain SDL practices (Loyens et al., 2008) in which learners evaluate and set their learning needs, seek appropriate learning resources, lead planned learning activities, and evaluate learning outcomes (Brockett & Hiemstra, 1991). Since creativity and SDL have been seen as interrelated (Edmondson et al., 2012; Cox, 2002), *SDL practices in creative activity* can be describe as an intertwined phenomenon. As we have presented above, both creativity and SDL can be seen as an individual or group activity that is influenced by organizational culture. By taking into account these cultural and collective frames (Glaveanu, 2015, 2017, 2018), the focus is on different manifestations of creativity and SDL (Lombardo & Kvålshaugen, 2014). According to the sociocultural point of view, SDL and creativity are phenomena that can be observed by an outsider. Thus, the ethnographic research seems to

offer a legitimate way to explore both, creativity (Glaveanu, 2015) and SDL (Baskett, 2013). In this study, we utilize the ethnographic research as a tool whereby we can focus on activities of individuals and groups (Heyl, 2001) as well as the meaning of the context, such as culture, other persons, and material factors (Glaveanu, 2015).

Research Formulation

Research aim and research questions

The aim of the study is to reveal the nature of the phenomenon of “SDL practices in creative activity.” Our research question is *How does the phenomenon of “SDL practices in creative activity” manifest in technology-based work from a sociocultural perspective?*

Methodology

The methodological approach for this study is ethnographic. The aim of ethnographic research is to describe and understand situations and phenomena from the point of view of the participants (Pole & Morrison, 2003; Cohen, Manion, & Morrison, 2007). The research aims to construct an interpretation in which the researchers combine theoretical knowledge, their own perspectives, and those of the researched (Hammersley & Atkinson, 2007).

Ethnographic research is often based on fieldwork. Observing the subjects of the research and interviewing the participants are means by which a comprehensive description of the phenomenon or culture is developed (Heyl, 2001). Thus, the starting point of an ethnographic study can be seen as a desire to thoroughly investigate the nature of a (social) phenomenon.

Data

The empirical data for the current ethnographic research were collected through interviews and field work (cf. Heyl, 2001; Hammersley & Atkinson, 2007). Field notes were collected during observation periods in the participating organizations where people’s behavior was observed in their own context (cf. Coffey, 1999; Hammersley & Atkinson,

2007). The data collection was conducted stepwise in various organizations in 2017 and 2018. In each of the organizations, data collection began by gaining familiarity with the organizations. Next, we made observations, focusing on the daily work of the technology personnel and the work situations that they encountered. In particular, the problem-solving situations, the interactive moments, and other situation-related activities were examined. Field notes were written in the field diary at the time the observations were made but also afterwards based on the recollection of the researchers (cf. Coffey, 1999). The aim of ethnographic writing is to illuminate an interesting situation or event, but writing also always involves the researcher's interpretation of the situation (Spradley, 1980). The field notes therefore include the researchers' own interpretations, although attempts to avoid over-interpretation were consciously made (Hammersley & Atkinson, 2007). Interviews were conducted within the observation periods, and participants were either randomly selected or selected based on the observation periods. The interview questions were, for example, "How would you describe creativity or creative activity in your work?," "How do you learn at work?," and "How is learning or creativity supported in your organization?" The details of the data collection are presented in Table 1.

The participating organizations (see Table 1) included one large ("*Group*") and two small ("*Device*" and "*Resolution*") organizations. These organizations were chosen for the study because they are Finnish technology organizations where the project-based work is, in one way or another, problem solving, creating something new in its context, developing work methods, and continuing to learn (Collin et al., 2017; Martins & Terblanche, 2003). Organizations were also chosen because of their "self-directed" working culture and structures (e.g., autonomous teams). Ethnographic research is often focused on researching one small group (Pole & Morrison, 2003). In this study, the research focused specifically on

the study of the everyday work of the employees and thus, for example, formal training sessions, supervisor discussions, and formal meetings were excluded.

Please insert the “Table 1. Participating organizations and data collection” HERE

Analysis

The analysis consisted of two phases (see Table 2), a preliminary analysis in the first phase and the main analysis in the second phase. The purpose of the first (preliminary) phase was to support our theory-based assumptions (e.g., how SDL practices are included in the creative activity process) and to provide a description of the phenomenon based on previous theory and interview data and also to provide a starting point for the second phase of the analysis. The interview data were analyzed by theory-based thematic analysis (Braun & Clarke, 2006). The process of the creative activity was identified using the previously created theoretical definition of the creative (activity) process (see Collin et al., 2017; Amabile, 1996, Nemiro, 2002). Thereafter, from the interviewees’ descriptions of the creative activity process, we identified and categorized the practices of SDL (see Brocket & Hiemsta, 1991) according to themes. This preliminary analysis produced a description of the phenomenon of SDL practices in creative activity together with previous research (see Section 4, Findings). This description offered a starting point for the second (main) analytical phase.

In the second (main) analytical phase, our purpose was to identify the sociocultural nature of the phenomenon of SDL practices in creative activity from field note data. We used ethnographic analysis, which is typical when the aim is to reveal the dialogue between theory, context, and interpretation (see e.g., Collin, 2006; Hammersley & Atkinson, 2007; Davies, 1999; Silverman, 2001). According to Hammersley and Atkinson (2007), an ethnographer

does not have to commit to a single theoretical framework but can increase the richness of the perspectives through theory triangulation.

Ethnographic analysis typically begins as early as during the data collection period, that is, observations. The analysis is often described as a “funnel-shaped process”; in the first stage (emphasised in the observing stage), the researcher looks for interesting situations and incidents (Davies, 1999), which can also be called key events (Fetterman, 2008). The ethnographic analysis proceeds from the unclear foci to more detailed interpretations (Davies, 1999; Hammersley & Atkinson, 2007; Collin, 2006). In the actual analysis, we read all the field notes to develop an overall picture of the data. After that we identified episodes (situations where SDL practices in creative activity manifest) from the field data, utilizing the descriptions (findings) from the first analytical phase, and also our own understanding of the significant situations that manifested during the observation phase. By means of ethnographic analysis, we searched for and identified cultural, material, or social environments, roles or practices (see e.g., Bogdan & Biklen, 1992; Collin, 2006), actions of different actors, and features that were included in the manifestations of SDL practices in creative activity. We confirmed our interpretation of the field notes with the help of the interview data. For example, in the case of uncertain interpretations from the field notes, we returned to the interview data to confirm the description given by an employee in a similar situation. The aim of the ethnographic analysis was to determine the sociocultural nature of SDL in creative activity, as manifested in the observed technology work. Our purpose was therefore to describe the specificity of the case and the phenomenon and not to seek to generalize the phenomenon (Pole & Morrison, 2003; Hammersley & Atkinson, 2007).

Please insert the “Table 2. The analysis of the study” HERE

Findings

In the technology field, work is characterized as the continuous problem-solving process through which projects progress. We found that problem-solving situations were defined as creative activity (processes). We deepened our understanding of the progression of three-phase process of creative activity based on previous theory and the preliminary (first phase) analysis of this study: 1) *structuring the problem (design phase)*, 2) *solving the problem (implementation phase)*, and 3) *evaluating the solution (evaluation phase)* (adopted from Collin et al., 2017; Amabile, 1996; Nemiro, 2002). In the preliminary analysis, we also examined the different phases of creative activity to determine how SDL practices are intertwined with creative activity. Figure 1 illustrates the formulated description of the phenomenon of SDL practices in creative activity.

Please insert the “Figure 1. Description of self-directed learning practices in the creative activity process (Figure adopted from Amabile, 1996, Nemiro, 2002, and Brockett & Hiemstra, 1991)” HERE

SDL practices were identified in every phase of the creative activity process. At the design phase, the practices of SDL included a self-directed assessment of existing skills and learning needs, setting learning goals, and designing learning methods. The practices of SDL relating to solving the problem (i.e., the implementation phase) were leading and implementing planned activities and the application of the learning (experimenting and testing). In the third phase of the creative activity, SDL was identified as practices in which an individual or a group evaluated their own learning, the methods used, and the possibilities for utilizing the learning in the future (cf. Brockett & Hiemstra, 1991).

Based on this understanding, it was possible to proceed to the second (main) phase of the analysis. The main analysis phase explored how the phenomenon of SDL practices in creative activity manifests in technology-based work. We categorized the findings of the main analysis according to the following three main themes that present the sociocultural nature of the SDL practices in creative activity:

- A combination of individual and collective action
- Solving common problems through dialogue and discussions
- An organizational culture framing of self-directed learning in creative activity

Next, we present each of the main themes, together with the related sub-themes, that were defined by our observers according to the different practices and their nature.

A combination of individual and collective action

Silent and focused moments

Many instances of creative activity were found in the field notes. We found several descriptions of *silent moments* in episodes of creative activity. Silent moments occur between conversation and other activities and refer to the employee's independent activity, which outwardly appears to be a focus on work and computer work in particular. Our interpretation, based on the field data, is that in a silent moment independent (autonomous) problem solving is carried out, but this is very challenging to interpret by means of ethnographic observation because it does not necessarily show many external signs. Therefore, in our research, we also used interview data to support our interpretations. The following quotation from the interview data confirms our interpretation based on our observations of silent moments that obviously relate to individual SDL in problem-solving situations:

At work, you have to develop some new code or solve a problem you haven't faced before, so you have to figure out alone how to do it. It is learning at work, all the time. (Interviewer: "How does this work in practice?"). In practice, using

Google—asking how to do it and how to solve the problem. Usually there are X number of options, one of which is good, or many can be good, and you have to think for yourself which of them you will experiment with. That it is the most common way to do it. (Software developer, R)

With the help of the interview and observational data, we discovered that at least some of the processes included in these silent moments involve independent and individual self-directed action. These moments may occur when an individual discovers the problem, makes independent decisions about the means of solving it, retrieves information from the Internet or blogs, and applies that learning to the current problem. All this happens in silent and focused moments at work. Thus, it seems that individual SDL in problem-solving situations is typical for technology work. The interviews seem to suggest that in the first instance employees are trying to solve problems, which are their responsibility, alone. Only as a secondary option do workers ask for help from colleagues: “If there is a big problem, then I won’t bother my colleague immediately; I’ll try to find out for myself” (Design engineer, GT).

Alternating between silence and talk

The field notes provided a great deal of information about the collective nature of creative activity and SDL. The material described frequent “continuous talking” or “conversational situations.” These situations and descriptions were also identified in the instances of creative activity we found. A typical situation in problem solving wherein that problem is the responsibility of an individual employee who cannot find a way to solve it independently is that he or she seeks help from others. In these situations, SDL appears to be both an individual and a collective action during which the individual’s work and conversations with colleagues alternate. The following quotation from the field note data describes this phase of creative activity:

Men are asking for Matt, whether he clarified some issue or not. I think that the issue has not been resolved before. Matt and others look at the screen of Matt's computer. Matt asks some questions of others: how they acted in the same kind of situation. Matt is reflecting on the whole issue and making suggestions.

Sometimes I feel that Matt speaks more to himself than others, even if others are answering him. One of the men returns to his own workstation. Matt and the man who is still in the situation are talking about the case. The man asks something in particular, and another man, who is sitting near them, says something, giving his own view. Now all of them are pondering whether the mobile payment has been made or not. This seems to be related to the whole issue. (Field note entry [10.3.2017], GS)

The previous example shows that a worker has encountered a problem situation that he is not able to solve independently. In the situation, SDL occurs when Matt himself finds that he needs more information, and he turns to a colleague who he believes is knowledgeable about the case at hand. In this way, collective action begins. Matt has been working on the issue independently, but his colleagues' skills and experience are also needed in order to reach a solution. Discussion with colleagues increases Matt's understanding of the subject and thereby promotes the creative process. SDL seems to be individual-oriented in this situation, but its nature varies between individual and collective action. This interpretation of the field note entry was confirmed by reviewing the interviewees' own descriptions of similar situations. The interview data strengthen the interpretation that creative activity (e.g., problem solving) includes SDL, in addition to learning taking place as either individual or collective practices, depending on the situation: "If you don't know anything about the problem, then you have to know who knows, and someone who knows tells you that this and this will make it work" (Electrical designer, GT). Sometimes situations and cases in the

technology field are completely new, in which case “you have to ask Mr. Google and try to find some information from there” (Electric designer, GT).

The problem solver as a learner and colleagues as counselors

In the case of SDL, the field data show that when the problem is the responsibility of an individual employee, he or she is often in the role of a learner and needs guidance, advice, help, and support from others. In this case, the more knowledgeable colleagues in the work environment will act as counselors, whose guidance and instruction help the problem solver. The following excerpt from the field data illustrates the learner–counselor situation:

An older man advises a younger person on the case, tells him where to find the relevant appendix, and describes what the process is all about. The younger man asks for more detailed information on the case, and the older employee explains what is usually done in this kind of process, what steps are likely to come next, and what the customer requires. It seems that this more experienced employee has a really sound knowledge of at least this thing, a good overall view of the process, and can also share his knowledge with other people. (Field note entry [13.5.2017], GT)

A typical situation illustrating the learner–counselor roles occurred when a novice needed supervision. Even though young people also worked independently, and “silent moments” were also found in their work, it seemed to be easy for them to ask for help from others. There were also particular individuals in organizations who often provided assistance, perhaps because of their experience or role (e.g., the project manager).

Solving common problems through dialogue and discussions

The exchange of questions and answers between peers

Many episodes of creative activity found in the field notes revealed that problem solving and SDL are a collective activity from the beginning. In this case, the problem affected more than one employee, and the above-mentioned learner–counselor roles were not detected. Instead, employees seemed to be peers and equal actors. The following field note describes the implementation phase of a creative activity process in which SDL is fully shared:

Two people working together with the computer are solving some problem. Both make suggestions: “Should we do it like that?”; “How about this?” The design continues jointly, and both are involved in acting and reflecting. The work seems to progress well. However, the coding does not work as it should, and the men are laughing, still pondering what is wrong in this case. (Field note entry [10.3.2017], GS)

Concrete common problem solving was realized through dialogue or discussion. In situations, as well as learning needs, goals, and plans (design phase), the actual problem solving and learning (implementation phase) appeared as shared reflection and an exchange of ideas.

Shared experiences as a prerequisite for joint decision making

Problem-solving situations could also relate to the workplace or internal team processes, such as the development of communication. In such cases, the problem or the need for development touches the entire work community, or at least the team. The following field note describes a situation in which employees in the small organization collaboratively discuss the problems of internal communication in the workplace:

An employee is sitting at a computer. He has the software open, and three others stand behind him. The employees wonder what would be a sensible channel for communicating with the work community, organizing work, and getting things done. The current system is problematic and inefficient, so another solution must

be developed. Sometimes some other employees leave, but then they come back. A person struggling with the software throws out more questions and thoughts. The conversation restarts. Eventually, the situation ends with the workers opting to take the software for testing for a while, alongside the old one. I interpret that if the software affects the power after the test, they will decide to continue working with it. (Field note entry [13.9.2018], D)

The situation reflects the practice of SDL because the employees are discussing ways to develop internal communication and systems without external guidance offered by the organization. The need for learning emerges from the problem. The group members learn something new from each other when sharing their own experiences of different software's good and bad aspects, trying to form a new, shared understanding about the best possible software for their team and organization. This understanding is used as the basis of the joint decision making.

Organizational culture framing of SDL in creative activity

Autonomy and freedom in everyday work

SDL in creative activity would not be possible without autonomy among the employees and teams involved in decision making relating to everyday work. In this context, the culture of autonomy and freedom enables an individual employee or a team to make decisions without the permission of the supervisor. The importance of autonomy appears in the following field note entry:

The development process related to the entire internal communication seemed to be progressed by the workers and ended their decision making, which was formed through discussion and the sharing of information. The CEO and the other owner did not seem to have anything to do with this process; they were not involved in any way in the spontaneous conversation situation. The situation is an excellent

example of how self-directedness appears in the team's common practice when a problem situation or need for development arises. (Field note entry [13.9.2018],

D)

In the episodes of creative action, we did not find any descriptions of command, intimidation, or any other use of power by which another person might have ordered the employee to do something against his or her will. Thus, freedom also means that the employees themselves decide when they need guidance and, if necessary, obtain it from their colleagues through common discussion and reflection. The interview data confirmed our interpretation of autonomy and freedom as a cultural factor enabling creative activity: "As I said, our work is like filling out crosswords: it doesn't progress if someone is yelling in your ear all the time and telling you what you need to do" (Software developer, R). In general, a commanding or controlling immediate leader or management culture was not seen as an incentive for creative activity. Freedom and autonomy seem to be a prerequisite for work, but assistance and guidance should also be available when needed.

A culture of guidance and shared information

The realization of collective SDL, and the progress of creative activity thereby, is slow and challenging if you do not know who to ask for help or who might have had similar problems. There were several descriptions of situations in the field notes in which the problem was not solved, for example, due to insufficient documentation or because it was not known who could help. The following field note entry reflects both the importance of shared information from the different areas of expertise in the organization's staff to the progress of creative activity and how this has been promoted by the organization:

Coffee break. I'm talking with the employees about the teams and projects. They say that some kind of sharing of experience happens, but the organization makes a general effort to increase awareness of who is doing what here. For example, a

couple of times a month there is a “coffee thoughts” event, which showcases completed projects and problem situations in projects. According to Tom, this is a good practice because it increases the knowledge among employees about who to ask for help with any kind of problem. (Field note entry [4.4.2017], GS)

We strengthened our understanding of this interpretation via interviews concerning the importance of shared information in the various areas of expertise in the organization to the progress of creative activity: “Sometimes, I have requested help from five people before I found the one who knew something” (Automation designer, GT). Knowledge of others’ areas of expertise, demonstrations of other projects, and the joint evaluation of problems contribute to the development of future creative situations. It is the responsibility of the organization to promote and share information on the different areas of expertise throughout the organization.

Claims of flexibility and easygoingness

In addition to freedom and autonomy, and a culture of guidance, creativity is dependent upon a culture of flexibility and leisure-like activities. Flexibility and agility were strongly reflected in the field notes; for example, problems were solved immediately, and there was time for discussion in the middle of the process. In these cases, the work also progressed quickly. The following short quotations from the field notes serve as a description of how colleagues are ready to help each other with the problem at hand and have real potential to help:

At the same time, a project manager enters the room and asks Henry whether he will come to see something. Henry immediately leaves with the project manager. (Field note entry [4.4.2017], GS)

Alex comes to the door to ask when it is possible to discuss the project people, who will start doing something new. Thomas says: “Right away,” and they start discussing it. (Field note entry [11.5.2017], GS)

Based on the field notes, it is clear that problem-solving situations come and go, and they involve a great deal of collective action that takes place immediately. This also tells us about the culture of the organization—the schedules must be flexible enough to enable employees to help their colleagues in problem-solving situations. However, lively and fast-paced problem-solving activity in organizations does not always emerge smoothly because time for learning may be limited: “You don’t always have enough time to devote yourself to it because we sell a project at a certain price, and we have a certain amount of time to complete that project” (Design engineer, GT). The interview material and the above quoted extract confirms our interpretation that there should be more time for learning, and, if it is not available, learning, and thus the realization of creative activity, becomes challenging. A culture of urgency thus supports the possibility of SDL in the process of creative activity.

Discussion

In this study, we found evidence that SDL practices are linked to the creative activity process and its phases. Our empirical analysis provided support for the theory-based assumption that creative activity is a problem-solving process that begins with design, proceeds with the actual implementation, and ends with an evaluation of the process and the result (cf. Amabile, 1996; Nemiro, 2002). In this process, SDL practices emerge at the beginning of the process as an assessment of existing skills and setting the learning goals, in the implementation phase as the actual learning activities led by the actors, and at the end of the process as an assessment of the learning (cf. Brocket & Hiemstra, 1991). Thus, SDL seem to be an important part of creative activity. This finding is in line with the indication of a link

between creativity and SDL also shown in previous research (Lemmetty & Collin, 2019; Edmondson et al., 2012; Cox, 2002). In the second (main) phase of the analysis, we found the following three themes that describe the nature of the SDL in creative activity: a combination of individual and collective action, solving common problems through dialogue and discussions, and the organizational culture framing of SDL in creative activity. Based on the findings, we suggest that SDL in creative activity is manifested as a sociocultural phenomenon in technology-based work context (cf. Glaveanu, 2015, 2011; Craft, 2008).

SDL in creative activity appeared either as an independent or a collective activity or as a combination of these practices, depending on the situation. We found situations in which SDL appeared to be a very independent and autonomous activity. Even in these “silent moments,” employees used external sources (such as the Internet) (cf. Glaveanu, 2011) or other means to learn. Thus, ideas or thoughts for designing or implementing solutions to problems do not appear to be completely individualized even though it is the responsibility of individuals to control their own actions and make decisions. Although the problem itself might be the responsibility of an individual, the observational data showed that assistance in solving problems is sought from others, and the action becomes collective (see also Paloniemi & Collin, 2012). However, we also found several situations in which the problem itself was originally shared. In these cases, the entire creative activity and SDL manifested itself collectively through interaction. These observations underline our interpretation of creativity as a collective phenomenon (cf. Csikzentmihályi, 1996).

SDL in creative activity is not limited to collaboration but is also dependent on the culture of the organization. Therefore, it can even be questioned whether it is possible to reach complete “self-directedness” in the work context. In other words, individual or team may not be fully responsible for learning because the organizational culture, customer requirements, and project resources often frame situations. SDL in creative activity seem to

require freedom and autonomy. Sufficient autonomy for creativity in this study seemed to relate to the ability of employees to make small decisions in relation to their own work. In previous studies, certain autonomy has been suggested as a one of the prerequisite for self-direction and creativity (Banks, 2010; Amabile, 1996). On the other hand, the need for autonomy in creativity has been challenged by the idea that constraints may actually act as triggers of creative activity (e.g., Rosso, 2014; Stokes, 2014). On the basis of our research, autonomy seem to be a prerequisite, but it is not necessary to extend beyond daily decisions. More research is needed to examine the level of autonomy that would be sufficient for creative activity in different situations. In the current study, autonomy did not exclude the need for guidance and assistance at work. This provides an interesting perspective on creativity: can creativity at work be guided and what is the role of guidance in creative activity?

According to current study, SDL in technology work emerges from a work situation or a problem that inevitably also directs the learning needs of an individual or a team. In these situations, SDL may not, for example, be the personal development goal of the actor, but learning seems to be related to problems that are based on the organization's business or customers' goals—not the individual's or team's own. For this reason, it can be questioned whether self-directedness in work can be realized as the ideal that has been described: learning, with its needs and objectives, that is fully based on an actor's goals and produced by internal motivation (cf. Knowles, 1975). SDL in creative activity seems to involve the setting of learning goals, leading the learning and evaluation of the learning by the individual or group but most often in relation to the work situation from which it emerges.

The ethnographic approach was well-suited to the current study focusing on the emergence of SDL practices in creative activity and the nature of the phenomenon (Pole & Morrison, 2003; Heyl, 2001). In particular, the collective and sociocultural nature of the

phenomenon could be reliably detected from the field notes. The trustworthiness of the interpretations was increased by reviewing descriptions of the phenomena as described in interviews with staff in the participating organizations (Heyl, 2001). The research and its methods made it possible to study everyday activities and revealed significant information about the nature of the phenomenon. The trustworthiness of ethnography is based on the continuation of observation for as long as the researcher sees the events repeated until they no longer provide new information about the subject (Cohen et al., 2007).

Limitations

In this study, we examined manifestations of SDL in creative activity, focusing on the observation of the subjects and the socio-cultural nature of the phenomenon. Ethnography examines the external manifestations of phenomena, so it was not possible to evaluate the individuals' mental processes, personalities, backgrounds, skills or characteristics. Hence, it is possible that the selected methodology partly affects the sociocultural emphasis of the findings and the importance of individual factors for creativity cannot be indicated in this study. The purpose of ethnography is to study the manifestation of the phenomena often in a specific target group and context (Heyl, 2001). Thus, the purpose of the study was not to produce a generalizable description of the phenomenon, and the transferability of the findings is limited to technology contexts such as the target organizations and everyday creative problem-solving situations. Therefore, it is not possible to argue that the findings would be transferable to any situation or context. This is also precisely because of the context-specific nature of the phenomenon at hand. It is also important to note that ethnographic research is a continuous interpretation that is influenced by both the researcher's own understanding and the observations made on the subject. The role of the researcher in ethnographic research must be carefully considered (Coffey, 1999). Therefore, from an ethical perspective, we tried

to report every phase of the research accurately (Cohen et al., 2007). Nevertheless, it is possible that the repeatability of the research in a way that would produce exactly the same findings may not be possible due to the significant role of the researcher in ethnographic research.

Because of the importance of creativity and learning in contemporary workplaces (e.g., Oddane, 2014), more information on creativity and SDL is still needed. In particular, it is important to elaborate on organizational structures and functions in order to develop practices that enable creativity and SDL at work. It is suggested that, in the context of creative activity, self-directedness in learning requires ready access to guidance and assistance in organizations. For instance, more experienced employees and project managers may play a greater role as guides and supervisors. Thus, leadership skills and the expertise of project managers and their understanding of the guidance of team members should be increased in work practices through such interventions as training or coaching.

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Tables

Table 1. Participating organizations and data collection

Organization	Group		Device Oy (D)	Resolution Oy (R)
	Solution (GS)	Technology (GT)		
Number of employees	160	120	25	30
Business area	Information technology	Electrical engineering, automation technology	Information technology	Information technology, technological consulting
Job titles	Software developer, customer service employee, ICT expert	Automation developer, electrical developer, design engineer	Installer, customer service employee, seller, technical expert	Software developer, consultant
Number of interviews	17	10	6	13
Number of observing hours	63h	42h	14h	28h
Number of field notes	26 pages (9405 words)	14 pages (5600 words)	5 pages (2864 words)	4 pages (1680 words)
Data collection epoch	Spring 2017	Autumn 2017	Spring and autumn 2018	Spring 2017

Table 2. The analysis of the study

Phenomenon	Self-directed learning practices in creative activity	
Phase	First phase ie. preliminary analysis	Second phase ie. main analysis
Analysis method	Thematic analysis	Ethnographic analysis
Basis	Theory-based	Data-based
Data	Interviews	Observations, field notes and interviews
Aim	Provide a description of the phenomenon based on previous theory and the interview data of the target organizations, which serves as a starting point for the second analysis phase	Get a description and understanding of the nature of self-directed learning practices in creative activity
Outcome	Answer to the research question: “How does the phenomenon of ‘SDL practices in creative activity’ manifest in technology-based?”	

Figure 1. Description of self-directed learning practices in the creative activity process

(Figure adopted from Amabile, 1996, Nemiro, 2002, and Brockett & Hiemstra, 1991)



