How Highly Self-Regulated Learners Work and Learn: An Interview Study

MASTER THESIS

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How the Workforce Learns in 2016

Courtesy of Degreed, 2016.

This figure illustrates different learning strategies that self-regulated learners opt for at the workplace and supports the results of this study. According to the findings and as presented in the figure, employees tend to prefer peer learning (Boss or mentor and Peers at work) and use of digital technology (Search the Internet and Browse specific resources) as learning strategies.

Abstract

Self-regulated learning (SRL) has gained ground in today's knowledge societies and contemporary work organizations as an effective way for the employees to manage their own learning and to ameliorate their performance at the workplace. Although literature has given an insight on how individuals regulate their learning, there is currently limited research at the workplace context. From the perspective of the basic psychological needs that are introduced in the Self Determination Theory (SDT), this study aimed at identifying recurring patterns of learning and working that emerged through the experiences of 39 highly self-regulated knowledge workers concerning specific learning strategies and autonomy so as to explain how highly self-regulated learners could meet their basic needs. The focus of this research as part of a team project was on the adult working life of the individuals. Semi-structured biographical interviews were used for the data collection and the data was coded. The findings revealed that peer learning and digital technology use as learning strategies and perceived autonomy support provided by the organizations could enable highly self-regulated individuals to meet their basic needs for relatedness, competence and autonomy at the workplace. These results set the ground for future research and practical implications concerning the ways that organizations and Human Resource Development (HRD) practitioners could promote and support SRL as a new way of learning at the workplaces of today.

Keywords: Self-Regulated learning (SRL), Self Determination Theory (SDT), competence, relatedness, autonomy, workplace, digital technology, peer learning, perceived autonomy support, biographical interviews.

Preface

This thesis is written to acquire the Masters degree in Educational Science and Technology at the University of Twente. The data collection was performed by Prof.dr. Anoush Margaryan and the project was conducted by Evangelia Tiniakou, Maria Tsiakala and Vasileia Vassou.

I would like to thank my supervisors, Maaike, Tim and Rike, for all of your critical feedback and support during this year of writing the Master thesis. Your guidance, your help and your knowledge on the topic were always more than useful to me. Thanks to Prof.dr. Margaryan for providing us with all these valuable data so as to carry out the project. Special thanks to my fellow project mates, Eva and Maria, for your moral and practical support.

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It was a long and valuable self-regulated learning journey! Preparing my backpack for many more that are coming ☺

Vasileia Vassou
Enschede, October 2017

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1. Introduction

Learning and knowledge have always been inseparable elements of the economic growth of contemporary societies which have been gradually transformed into "knowledge societies" (Kessels, 2001). Today's societies focus on the learning occurring at the workplace where the individuals develop new skills and competencies that could attribute to the competitiveness of the organizations (Kunjiapu & Yasin, 2010). Concerning the employees as members of these new learning working environments, they prefer to learn in a more informal way by taking advantage of the opportunities for learning offered inside the organizations rather than following the proposed long-established ways for learning and development such as trainings or courses (Margaryan, Milligan, Littlejohn, Hendrix, & Graeb-Koenneker, 2009). More specifically, knowledge workers also opt for a self-directed way of learning at the workplace (Margaryan, Milligan, Littlejohn, Hendrix, & Graeb-Koenneker, 2009).

In this new workplace context, self-regulated learning as a contemporary way of learning, is defined as a social and collaborative process that permits the individuals to set and define their own learning goals, to plan, to self-reflect on what they learn (Margaryan et al., 2009) and to take responsibility of their general learning and development (Fontana, Milligan, Littlejohn, & Margaryan, 2015). Moreover, employees' SRL skills development is important for their effective learning and their better performance at the workplace (Fontana et al., 2015). Self-regulation is also crucial for individuals' success at the contemporary working environments (Lord, Diefendorff, Schmidt, & Hall, 2010).

Most studies so far have identified factors influencing individuals' SRL skills development either at the family context (Lee, Hamman, & Lee, 2007) or during the school years (Zimmerman, 2002). However, self-regulated learning as a capacity also depends on the context where it is developed (Zimmerman & Schunk, 2001). This means that later at the adult working

life, the ways individuals regulate their learning are defined and influenced by the workplace context. In this workplace context, despite their capacity to self- regulate their learning, individuals need the autonomous will to do so (Reeve, Ryan, Deci, & Jang, 2008) influenced by their need to experience feelings of competence, relatedness and autonomy which are described in the Self Determination Theory (SDT) and so as to be successful at their workplace (Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010). Reeve et al. (2008) suggested for instance that when the learning experiences lead to satisfaction of these feelings, then individuals are more intrinsically motivated and more autonomous self-regulated learners. Crouse, Doyle, and Young (2011) stated that both the workplace learning strategies the employees use and the autonomy support provided by the organization could be indicators of how highly self-regulated learners fulfil these three basic psychological needs. As a result, based on the study of Reeve et al. (2008), which was conducted at the school context, this research will introduce a new perspective by identifying this time these indicators at the workplace context.

The purpose of this present study is to measure how highly self-regulated learners work and learn from the general scope of their needs for competence, relatedness and autonomy by identifying and analyzing recurring patterns in the 39 interviews of knowledge workers. The focus is on the adult working life and especially on specific learning strategies, such as peer learning and digital technology, used by the individuals and autonomy support provided by the workplace. The interviews used in this study can reveal recurring patterns concerning effects of some events on current behaviors of the respondents. In this particular case, patterns at the workplace will reveal how SRL is linked to the SDT according to the experiences of adult knowledge workers.

2. Theoretical Framework

2.1 Self-regulated Learning (SRL)

Zimmerman (2005) in his definition of SRL stated that "self-regulation includes self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals" (p.14). During SRL, the learning is seen as "a cyclical and open-ended process that includes three phases: forethought, performance or volitional control and self-reflection" (Zimmerman, 1998, p. 2). In the model which is introduced by Zimmerman, Boekarts, Pintrich, and Zeidner (2000), forethought includes mainly the goal setting and the planning towards the attainment of these goals, performance depicts the self-control in order to gain focus and attention while self-reflection stands for the self-evaluation and assessment of the whole learning process. Moreover, self-regulation, as an essential component of workplace learning (Fontana et al., 2015), is beneficial for the enhancement of the growth of individuals and positively affects their well-being (Lord et al., 2010).

Therefore, additional research is required on how employees who have the capacities to regulate their learning use the affordances at the workplace so as to be highly self-regulated learners (Margaryan, Littlejohn, & Milligan, 2013). The focus of this research is at the workplace since workplace conditions are changeable not only over time but also among different workplace environments and could be influenced so as to meet the needs of individuals for competence, relatedness and autonomy.

2.2 SDT and SRL

Self-determination theory (SDT) which was developed by Edward L. Deci and Richard M. Ryan supported that the satisfaction of the three basic psychological needs, competence, autonomy and relatedness, is a crucial factor for the optimal functioning of employees at the workplace (Broeck et al., 2010). More specifically, *competence* refers to the need of individuals

to interact and control the sources provided by their environment, *relatedness* depicts the need of individuals to interact, connect with others and have the sense of belongingness while *autonomy* is explained as the need for a sense of freedom and control in the lives of individuals (Deci & Ryan, 2000). Reeve et al. (2008) illustrated that from the perspective of SDT, self-regulation is autonomous when the regulation of individuals' behavior is based on their interests and values. Moreover, concerning the different requirements so as to reach an effective and autonomous self-regulation, the fulfilment of the basic psychological needs for competence, relatedness and autonomy is mentioned as one of them (Reeve et al., 2008). So far the relationship among SDT and SRL has been measured and it has been found that the fulfilment of the aforementioned needs of students has led to an autonomous self-regulated learning at classroom settings. More specifically, teachers were the ones responsible for providing students with autonomy support and the appropriate learning materials and for promoting relatedness among students and their peers at school. In all these cases students fulfilled their basic psychological needs and also developed their initial and amateur self-regulated learning skills (Reeve et al., 2008).

Placing the interest at the work environment, workplace as a setting seems to play the role of teachers and it could facilitate highly self-regulated employees to fulfil their basic psychological needs by creating the affordances for them. These needs could be covered by promoting the appropriate learning strategies to be used by the employees and also by providing the required autonomy support. Empirical evidence for instance has revealed that engagement in peer learning at the workplace (Margaryan et al., 2013) and search for sources provided by their environment for learning such as digital technology use (Margaryan, Littlejohn, & Vojt, 2011) are both learning strategies influencing SRL. Perceived autonomy support is also a facilitator of self-regulated learning of individuals (Margaryan et al., 2013). Reeve et al. (2008) explained that these feelings –competence, relatedness and autonomy- could help individuals

to become self-regulated learners by translating external and social regulation to a more internal one.

This interview study is focusing on revealing the strategies that employees use to learn at the workplace and the autonomy provided by the organization from the general scope of how their basic needs could be fulfilled. Perceived autonomy support is also expected to have a positive effect on the two learning strategies mentioned above. Hence, the investigation of *peer learning*, *use of digital technology* and *perceived autonomy support* will further explain the relationship between SRL and SDT at the workplace.

2.2.1 Learning Strategies

A common characteristic of self-regulated learners is that they use specific strategies to learn at the workplace (Margaryan et al., 2013). There are many different categorizations in the literature concerning learning strategies and activities both at the educational and workplace context. For instance, the proposed taxonomy for learning activities by (Chi, 2009) distinguished among active, constructive and interactive learning activities where individuals are expected to actively engage in learning processes by searching for additional knowledge when needed and by taking into consideration their peers' contribution to these processes. Concerning learning strategies at the workplace, teachers were found to learn at the workplace while interacting or collaborating with their colleagues, asking for their help or advice when needed and when searching for information online using literature or search engines in the web (Grosemans, Boon, Verclairen, Dochy, & Kyndt, 2015). The autonomy support teachers received at their workplaces was important concerning their choice for the learning strategies they used (Grosemans et al., 2015). From this recent study of Grosemans et al. (2015), it becomes clear that individuals engage in both individually and socially oriented learning activities at the workplace. In other words, work environment creates the affordances and conditions, such as feedback exchanging, reflection, coaching and information seek, in which

employees engage in both individual and social informal learning (Janssens, Smet, Onghena, & Kyndt, 2017).

After taking into consideration the study of Niemiec and Ryan (2009) referring to a school context, the types of learning strategies used by self-regulated learners could reveal how highly self-regulated learners work and learn so as to experience feelings of competence and relatedness at the workplace. Taking into account the previously discussed needs of the SDT (relatedness and competence), this current study is focusing on two specific learning strategies at the workplace: peer learning and digital technology use.

Peer learning. Peer learning can be defined as a process which permits and facilitates the gain of knowledge by exchanging ideas, thoughts or experiences among peers. Hence it is a two folded process which includes more than one individual in the pursuit of knowledge and there are different forms. First, team work at the workplace where peers mostly communicate and collaborate with each other and share knowledge in a interdependent way in order to complete several tasks (Eraut, 2009). Moreover, feedback exchanging (peer assessment) includes participation in a cognitive and discursive collaborative process which helps individuals to develop their identity (Kollar & Fischer, 2010). Furthermore, peer learning as a type of learning from others can occur in the form of help-seeking among colleagues (van der Rijt et al., 2013). Mentoring or coaching and more specifically peer- coaching is also a form of peer learning (Parker, Hall, & Kram, 2008). Finally, role models are also part of peer learning and refer to colleagues who the new comers employees learn and work with at the workplace (Filstad, 2004). The different forms of peer learning presented here are decreasingly less collaborative meaning that in the first four (team work, feedback exchanging, help seeking, mentoring/coaching) individuals collaborate more with their peers while learning than role models, in which the focus of peer learning is more self-centered.

After taking into account the findings of previous studies, it is possible to examine how peer learning is used as a strategy to work and learn at the workplace from the perspective of relatedness which are described in the SDT. For example, the need for relatedness could be fulfilled by using help seeking behaviors at the workplace where the employees count on the help of their peers while learning (Holman, Epitropaki, & Fernie, 2001). Furthermore, it is interesting to investigate peer learning and its forms as a strategy that self-regulated learners use since individuals have been found to be highly dependent on the social network and on collective knowledge and to count on their colleagues so as to obtain knowledge when needed at the workplace (Margaryan et al., 2009).

More specifically, peer learning seems to be important for both the helpers and the ones who get help by this collaborative learning procedure and is applicable in several learning contexts ranging from school to workplace (Topping, 2005). Team work and the general belief of belonging to a team creates a sense of psychological safety for individual learners, enhances better learning outcomes and promotes the collaboration between the members involved in the learning process (Van den Bossche, Gijselaers, Segers, & Kirschner, 2006). Moreover, when students are working in teams as part of their regulation of their learning, their socially constructed self-regulation is augmented (Järvelä & Järvenoja, 2011). This current study will grant a more specific description of the types of team work that self-regulated learners use at the workplace in the general context of their basic psychological need for relatedness. Feedback exchanging (peer assessment) is beneficial when the appropriate opportunities are offered and feedback exchanging among peers is promoted (Boud & Molloy, 2013). As for help-seeking, both human and non-human forms of help seeking especially in technologically enhanced environments promote a better learning and understanding of the individuals (Aleven, Stahl, Schworm, Fischer, & Wallace, 2003). Moreover, according to van der Rijt et al. (2013), a deeper insight on the distinction between help seeking and feedback exchanging at the

workplace is needed. Additionally, it is important to investigate specifically whether the individuals tend to seek or to give help or advice and feedback. Peer- coaching at the workplace is a beneficial strategy for the learning of employees when the relationship among coach and coachee is being built with a view to their professional development (Parker et al., 2008). In the proposed research model of Schunk and Mullen (2013) referring to managers and protégés, the post mentoring effects seem beneficial since their self-regulatory initiatives are being activated. This study's focus is on whether the individuals tend to be coaches themselves or receive coaching/mentoring at their workplaces. Finally, as for role models, previous studies have proved that individuals are in favor of role models who promote their chosen self-regulation in academic settings (Lockwood, Jordan, & Kunda, 2002). The importance of enough opportunities provided by managers to individuals so as to find easily their role models is also underlined (Gibson, 2004). Therefore, it is useful also to focus the present study on who the employees consider as role models and whether the role models remain the same throughout the professional life of the knowledge workers (Gibson, 2004). To conclude with, the different forms of peer learning investigated in this current research will give a better understanding on which strategies how self-regulated learners use to learn at the workplace from the perspective of their basic psychological need for relatedness.

Use of digital technology. Digital technology use can be defined as the use of digital devices or systems online for purposes of knowledge gaining or knowledge sharing. The last decades digital technology is present at the workplace with 42% of employees having computers with Internet access (Benson, Johnson, & Kuchinke, 2002). According to Benson et al. (2002), nowadays digital technology is used by HRD departments so as to enhance the learning of employees at the workplace. It also helps employees' decision making and completion of tasks and it permits their direct communication (Benson, Johnson, & Kuchinke, 2002).

According to the different forms of technology found in the literature, a main distinction among interactive and non –interactive ones can be made. Concerning the interactive types of technology, they include the use of tools and services that allow users to interact with each other. Collaborative web tools like google services for sharing documents or data as well as applications for texting online are included in the interactive types of technology (Thompson, 2013). Remote work is also included in the interactive forms of digital technology and was found to facilitate the long distance workers who are working fully or partially online as an effort to maintain a balance between work and family life (Hardill & Green, 2003). At a recent study, users identify communication technology as an interactive type of technology which includes all kinds of online communication ranging from social media to blogs or forums (Thompson, 2013). By contrast, non-interactive types of technology include the tools or services that do not promote the interaction among users. For instance, web reading, and online databases for journals or books (Thompson, 2013). Online search engines could also be considered as a non-interactive type of digital technology. E-learning could be classified as a specific type of technology neither interactive nor non-interactive one. It refers to the use of electronic devices, computers or in general the web for learning, educational and training purposes (Moore, Dickson-Deane, & Galyen, 2011). Concerning e-learning, it is used at the workplace as a means of informal learning (Tynjälä & Häkkinen, 2005).

Olgren (2000) stated that the need for competence as it is described in the SDT could be fulfilled by using technology where the employees tend to interact and have control over the sources provided by their work environments. Taking into consideration the three basic phases – forethought, performance, self-reflection- of SRL which are introduced by Schunk & Zimmerman (1998), it becomes clear that technologically enhanced working environments could enable individuals to keep track of their learning and evaluate their learning process (Steffens, 2006). More specifically, self-regulated learners use web-based pedagogical tools

and especially communication and interaction tools for the accomplishment of tasks and assignments (Dabbagh & Kitsantas, 2005). Social media together with blogs or forums have also been found to be useful for the creation of successful learning environments for SRL where the need for competence is fulfilled as these environments provide their users with solutions for online communication, sharing of information and e-learning (Dabbagh & Kitsantas, 2012). The need for competence could also be covered through e-learning, since a previous study revealed that when self-regulated learners use an appropriate e-learning system they could improve their learning performance by permitting the evaluation and examination of their own learning goals (Chen, 2009). Therefore, this research is useful so as to realize how the different types of technology that self-regulated learners use at the workplace could help them to meet their basic need for competence.

2.2.2 Perceived Autonomy Support

In the study of Hicks, Bagg, Doyle, and Young (2007), autonomy was identified as an important factor which facilitates learning at the workplace. Furthermore, perceived autonomy support is also considered to facilitate the self-regulated learning of individuals (Margaryan et al., 2013). As a result, this study focuses on perceived autonomy support since when provided by the organization it could cover employees' innate psychological need for autonomy, according to the SDT, during their efforts to self-regulate their learning.

Autonomy is a multidimensional concept which is often described as a characteristic of engaging workplaces where the employees play their role on the job design (Truss et al., 2014) known also as job crafting (Wrzesniewski & Dutton, 2001). Taking into consideration the scale which is introduced by Hagger et al. (2007), perceived autonomy support can be defined as the degree that individuals perceive that they are free and independent to organize their work as they wish and to execute the tasks in the way they prefer. Organizational theory has

acknowledged the benefits of autonomy of the individuals at the workplace by linking it with the better attainment of the professional goals (Sabiston & Lascbinger, 1995).

Both individual and group autonomy at the workplace have been found to promote the effectiveness of the organizations (Langfred, 2000). Concerning employees' autonomy, previous studies have tried to investigate whether the perceived autonomy support by the employees was the same as the real autonomy that they seem to have when they were rated not by themselves but by other sources (Breaugh, 1999). A recent study on perceived autonomy support revealed that college students who experienced the autonomy support by their supervisors tend to become more empowered and to seek for more feedback by building relationships with their supervisors (Beenen, Pichler, & Levy, 2016). Moreover, perceived autonomy support experienced by teachers when it comes to the choice of the school they work, led to their better performance and to higher personal investment (Gawlik, 2007). Furthermore, the two recent studies of Moreau and Mageau (2012) and Gillet, Colombat, Michinov, Pronost, and Fouquereau (2013) including health professionals and their colleagues and supervisors, revealed that perceived autonomy support was linked with individuals well-being and job satisfaction. Autonomy has been studied in the context of learning and a significant relationship was also identified between students' autonomous learning and the development of their self-regulation (Niemiec & Ryan, 2009). Moreover, high autonomy support from teachers was connected to more self-regulated strategies for learning used by students (Vansteenkiste et al., 2012). Therefore, in line with these past studies focusing in the educational field, more research is needed at the workplace.

As a result, after taking into consideration the importance of the workplace social network and colleagues of individuals which were mentioned by Margaryan et al. (2009), this current research with a sample of knowledge workers coming from two different countries could provide some additional knowledge on whether highly self-regulated learners perceive

autonomy support as important for their learning at work in the general context of their basic psychological need for autonomy at the workplace.

3. Research Question

It is noticable that the study of Reeve et al. (2008) set the ground for some theories of SRL in the educational field by defining how self-regulated learning is promoting the fulfilment of the basic psychological needs which are described in SDT: competence, relatedness and autonomy. However, the ways in which highly self-regulated learners work and learn at the workplace in the general context of the above psychological needs are still not well investigated.

Despite the ability of some individuals to self-regulate their learning, they are influenced by their need for relatedness, competence and autonomy at the workplace. Therefore, the main research question is formulated which could reveal how self-regulated learners work and learn at their work environments.

The research question is:

How do highly self-regulated learners use peer learning, technology and seek for autonomy support so as to fulfil their need for relatedness, competence and autonomy at the workplace?

The relationships among SRL and SDT will provide some noticable results. More specifically, patterns regarding specific learning strategies that self-regulated learners use and the perceived autonomy support provided by the work environment will further explain how highly self-regulated learners could fulfil the needs of individuals for relatedness, competence and autonomy. The term ‘pattern’ in this study is used to describe something that recurs in the experiences-interviews of the 39 highly self-regulated knowledge workers concerning how they learn and work at the workplace. These recurring patterns which were identified by using the coding scheme (see Appendix).

4. Methodology

4.1 Research Design

This particular study can be categorized as a qualitative interview study since it was based on semi-structured interviews of a broader life history (biographical) study. In this biographical study, the researchers inspired by the study of Roe (1953), were trying to identify patterns which recur in the respondents' life span from early childhood till adult working life so as to correlate them with particular characteristics the knowledge workers have later in their working life. The whole study was a team project conducted with two more researchers who focused on early childhood and school factors respectively. However, the focus of this current paper was on the adult working life and especially on identifying common patterns in the experiences of the participants concerning both the learning strategies they use and the perceived autonomy support provided by the organization from the scope of the three basic psychological needs – competence, relatedness and autonomy- of the SDT.

4.2 Participants

The participants of this research were 39 highly self-regulated professionals in knowledge-intensive domains ranging from private to public sector in different organizations both in the Netherlands and in Scotland. Regarding participants' occupation, all of them were knowledge workers and were working either at university positions such as lecturer, professor or researcher or at a research related center. Furthermore, some of the participants were living in the Netherlands while others were living in Scotland. Concerning the country of birth, (7,14%) were born in an EU country. As far as the sampling technique is concerned, 39 out of approximately 160 knowledge workers, who scored highest at an initial SRL@WORK questionnaire, were invited afterwards for an interview. In general, the high scores among the

participants at the initial selection phase of the SRL@WORK questionnaire made the sample homogeneous.

4.3 Instrumentation

In this research, the data was provided by Prof. Anoush Margaryan in 2014. Semi-structured face to face interviews were used as a qualitative method so as to gather data from each of the 39 highly self-regulated knowledge workers. In the interviews there were open-ended, semi-structured questions which triggered the whole discussion between the researcher and the respondents (e.g "*How about self-regulated learners at work? So would that work in a different way?")*. This instrumentation was the most appropriate since the participants provided information about their experiences or opinions on a specific topic and even on sensitive topics (van Teijlingen & Forrest, 2004). In this case, the research aimed at gathering information concerning specific patterns in the adult working lives of the participants. Moreover, the interviews were conducted through physical meetings with the researcher and the participants were audio-recorded.

4.4 Procedure

The data of this study was gathered in three phases. More specifically, at first place, individuals were contacted by email and asked to fill in the SRL@WORK questionnaire online. The questionnaire aimed at demographic data gathering and general questions measuring whether and how they regulated their learning at the workplace. At the second phase, a preliminary analysis of the returned questionnaires was conducted and the questionnaires were scored so as to reveal if the respondents are highly self-regulated learners. All respondents of the questionnaire received different SRL scores according to their answers. At the third phase, the 39 knowledge workers were invited for a biographical interview according to their scores on the initial SRL@WORK questionnaire. The interviews were audio-recorded, transcripted

and a copy of them were provided to the participants in order to give their consent for using them for this research. Participants were also thanked for their contribution to the study with a written letter. The individuals who had already been interviewed were asked to suggest other potential participants for this study.

4.5 Data Analysis

Atlas ti, the software for Qualitative Data Analysis, was used in this research. A coding scheme was created with all the variables, the labels and sublabels, definitions and examples on how highly self-regulated learners work and learn based on the learning strategies they use and the provided perceived autonomy support by the workplace (see Appendix). The creation of coding schemes is one of the three proposed ways for a qualitative content analysis that are described by Hsieh and Shannon (2005) where the codes-labels are created taking into account the content of the dataset.

Regarding the coding scheme, it was initially designed by the researcher in collaboration with the other two researchers of the team project, was revised several times and the final version was eventually used for coding the interviews. The coding scheme initially included some theory-driven labels for the variables of our study (peer learning, use of technology and perceived autonomy support) retrieved from the literature. However, at a later stage more data-driven sublabels were added in the existing coding scheme in order to specify in a more comprehensive way our variables, which means that the researcher created them after being inspired by the content of the data. The labels and the sublabels were also discussed and revised several times by the three coders and the supervisor's suggestions.

To be more precise, at the coding phase itself, the three coders firstly assigned the codes to the different parts of the interviews depicting the variables ('peer learning', 'use of digital technology' and 'perceived autonomy support') so as to end up to a segmentation of the

interviews. For instance, the following quotation *'In my daily work we use very much Google services, like Google Docs or Google Forums or Google Presentation and such which we are using just now'* was segmented as the variable 'use of digital technology'. At a second phase, the theory-driven labels were assigned to the same segmented parts. For example, the label 'Interactive types of technology use' was also assigned to the segmented answer of a participant included above. Lately, more data driven sublabels were created, for instance 'communication' was assigned as well to the segment above in order to define better the variable 'use of digital technology'.

Concerning the validity of this research, there was a checking by all the three researchers on whether the created codes (labels and sublabels) display the same information for each of the variables as the information found in the literature for them. Furthermore, all the three researchers assigned codes-labels in one third of the interviews covering the three life phases, making the coding procedure more objective and equal and assuring that each interview is being coded by at least two researchers. The patterns which appeared repetitively in the interviews were coded with the same labels by all the three researchers. For the complete coding scheme (See Appendix).

Concerning the reliability, Cohen's kappa for qualitative content analysis was calculated in order to ensure that the measures- and in this case the variables and the theory driven labels used in this study- were reliable and that there is high quality agreement among the researchers-raters (Burla et al., 2008). Reliability checking concerning the segmentation was performed to a 10% of the total amount of interviews, thus 4 interviews and their average Cohen's Kappa was 0.75.

At a later stage, a reliability checking was performed according to the Formula 2 $(n\ x\ n)$ to every theory driven label of the coding scheme as shown in Table 1 below. Thus, peer learning

included Team work with Cohen's Kappa=0.80, Feedback with Cohen's Kappa=0.71, Advice/help with Cohen's Kappa=0.74, Role models with Cohen's Kappa=1 (however for this label the number of quotations were not enough to perform the reliability check strictly according to the formula which is described above). Furthermore, use of digital technology included the label Interactive Types of Technology with Kohen's kappa=0.91 and Non Interactive Types of Technology with Kohen's Kappa=0.79. Finally, perceived autonomy support included Autonomy with Cohen's Kappa=1 and Non Autonomy with Cohen's Kappa=0.74.

Table 1. *The Cohen's Kappa for the theory driven labels*

Theory Driven Labels	Cohen's Kappa
Team work	0.80
Feedback	0.71
Advice/help	0.74
Role models	1
Interactive types of technology	0.91
Non interactive types of technology	0.79
Autonomy	1
Non autonomy	0.74

5. Results

In this current study, based on coded segments of interviews, two different learning strategies (peer learning and use of digital technology) at the workplace and perceived autonomy support revealed how 39 knowledge workers with high self-regulated learning skills work and learn at their workplaces. Based on the final coding scheme, all the statements were coded and analyzed in accordance with the three general categories-variables: peer learning, use of digital technology and perceived autonomy support. It is important to mention at this point that the labels of the coding scheme were assigned to segments only when the participants referred to them as something that it does happen at their workplaces. Thus, there was no need of including negative answers for all the labels. For instance, when in one interview there is the label/code "peer learning" this means that this participant uses peer learning and not that the participant mentioned "peer learning" but he/she did not use it at the workplace.

Peer learning. Within this category, almost all participants (*N*=37) declared that they are learning from peers inside the organizations. Only 2 of the respondents did not mention peer learning in their interviews. Concerning the 37 respondents, most of times they preferred to approach their colleagues so as to learn at the workplace. In Table 2 below, there are the answers of the participants concerning the types of peer learning they experienced at their workplaces. As it can be seen, communication/collaboration in terms of team work among peers was the most recurring pattern of 'peer learning'. Moreover, almost half of the participants stated that they had a coach or a mentor to learn by his/her side and they used to seek for help and advice among their peer colleagues.

Table 2. *Number of responses for the data driven sub-labels of 'peer learning'*

Peer Learning	Number of respondents
Sharing knowledge	14
Task division	5
Communication/collaboration	24
Feedback	13
Advice	16
Coachee	16
Coach	3
Role models	8

For instance, a respondent mentioned:

'I mean the same way having discussions with other people or doing projects together, that's also a way, so those publications are a way of communicating, it's our way of communicating in the academic world and seeing that was the importance, so the discussion is the importance and the trying to get the thinking on issues one step further is the goal, not that much this one publication.'

Fourteen of the respondents mentioned that they work in teams in order to share knowledge with each other. For example, one participant declared that:

'So there are two colleagues I might just ring back and say 'Have you been trying to contact me? We'll meet informally, just bump into each other and talk about things. We have team meetings every semester, every couple of months anyway. We had one yesterday and we also have research meetings once a month now. So we share what people are researching and somebody usually does a presentation and we hear about it.'

As far as the forms of peer learning are concerned, the same participants seemed to use a combination of advice/help and feedback seeking. Furthermore, the majority of participants were found to use communication/collaboration as a form of team work while having a coach at their workplaces.

For example in one of the interviews a participant said:

'I think though for me the best form of learning is actually working with people, so collaborating and trying to solve a problem. So part of that can be in conversation or part of it can be in the output that you're trying to produce, the process of producing that output, for me is the learning experience (…) That's not true, I did have a coach, briefly when I was at Glasgow Caledonian, so my development funding was used to pay a coach and I would meet with a coach every month or so (…).'

In general, the participants mentioned peer learning and more specifically communication/collaboration in terms of team work as a significant indicator regarding the ways they choose to learn at the workplace and monitor their learning with the help of their peers. As a result, peer learning is a learning strategy that highly self-regulated learners use when they work and learn at their workplace and after taking into account the basic needs of SDT, it can be considered as an indicator of how individuals with high SRL skills could fulfil their need for relatedness as well.

Use of digital technology. Concerning this category, almost all the participants (*N*=38) identified themselves using digital technology for their learning at the workplace according to the analysis of the interviews.

Table 3. *Number of responses for the data driven sub-labels of 'use of digital technology'*

Use of digital technology	Number of respondents
Web tools for communication (Interactive)	12
Social media (Interactive)	14
Forums (Interactive)	4
Blogs (Interactive)	5
Remote work (Interactive)	7
Journals (Non interactive)	14
Search engines (Non interactive)	15
E-learning	13

The different types of digital technology used by the participants according to their answers could be seen in Table 3 above. More specifically, 15 respondents stated that they use search engines and prefer a non-interactive type of technology in order to get the information they need. Concerning search engines use, the answers in the interviews most of times connected search engines with google search where the participants often preferred to look up a term or information that was unknown to them rather than asking to follow a course or asking for a formal type of learning provided by their organization.

For example, one of them stated:

'Yes so I suppose a fairly simplistic starting point would be I use Google. So obviously there's a lot behind that, but yes I do use the web a lot.'

Concerning the two second most recurring patterns of digital technology use presented in Table 3 above, 14 participants stated that when they want to gain some knowledge on something they do not know, they prefer to search for published articles online with specific and scientific knowledge on the topic, thus again using a non-interactive type of technology. Fourteen respondents stated that they also prefer to use social media to gain knowledge on a topic that they do not know when they wanted to learn at work, which is an interactive type of technology. However, although social media use was perceived as an interactive type of technology, the majority of the respondents declared that they prefer to be more consuming rather than contributing users. For this reason, it is important to mention here that although sometimes the same participants declared that they used both non-interactive and interactive types of technology, it seems that the majority of them are rather non-interactive technology users.

For instance, two of the participants mentioned:

'But on the other hand there are a lot of publications on the internet and one of the other things is that we have a special interest group within our organization about different subjects.'

'So I was doing all of that from online library, the databases and then I get ideas by just reading my Facebook feeds.'

E-learning in the form of courses at the workplace was used by 13 participants most of times as a means of their professional development. Furthermore, web tools for communication follows as recurring pattern mentioned by 12 participants when searching information and supplementary knowledge online for their work. Concerning the types of technology, participants were found to look for information using both search engines and journals online. Participants who used to search for information online, used sometimes e-learning as well so as to gain more knowledge. Moreover, web tools for communication and social media were in their combination chosen by the participants so as to communicate online with their peers at work.

For instance, two participants stated that:

'*Internet, previous publications probably is the first source I would turn to when I need some information.*'

'Of course email and that kind of thing I'm very active there. I mean if people contact me, this is just every day kind of medium and internet of course, those kind of things, that's something I'm using every day for several hours (…) But with regard to social media, yeah I don't know, I think there is so much out there and it's so overwhelming all this information I think if you want to find me you can find me'.

To conclude with, based on these results this current research revealed that both interactive and non-interactive types of technology were almost equally preferred among the participants who use digital technology when they feel the need to learn something related to

their work. However, non-interactive types of technology seem to be the leading pattern when participants take the initiative to search for information in terms of their need for additional knowledge at the workplace. As a result, from the perspective of SDT and the general need of individuals for competence, digital technology is used as a learning strategy at the workplace and more specifically non-interactive types of technology.

Perceived autonomy support. In this category, more than half of the respondents (*N*= 21) mentioned perceived autonomy provided by the organization as important while learning at work (Table 4). On the other hand, thirteen of the participants stated that non autonomy plays an important role when it comes to the ways they learn at work. Seven participants referred to both autonomy and non-autonomy as important factors for the regulation of learning at work, while five respondents did not refer to perceived autonomy support at all in their interviews.

Table 4. *Numbers of responses for 'Perceived autonomy support'*

Perceived autonomy support	Number of respondents
Autonomy	21
Non autonomy	13
Both	7
Not mentioned	5

Concerning autonomy, most participants tried to define perceived autonomy at work in terms of either the flexibility given by their fellow colleagues who had a degree of authority at their workplace or in terms of their flexibility to plan and organize their work. Most of the participants revealed that autonomy was perceived most of times as flexibility given by colleagues with authority rather than flexibility in planning or organizing at work but the difference between the two was not striking.

For instance two of the participants stated:

'I've almost always worked in a research context and that means I've had a lot of freedom and flexibility about how I use my time and that is something that I value, not very good at being in a situation where somebody tells me what to do, in fact I don't like that at all.'

'Work is great, as I said I'm completely self-managed at work, so I can focus on things I want to do and I manage my time very effectively at work.'

Concerning non autonomy, respondents identified it as important and accepted at their workplace and almost half of them experienced autonomy and non-autonomy simultaneously at their workplaces (Table 4). More specifically, some of them recognized themselves as followers of authority by choice which means that they chose consciously to obey to authority while some others stated that they accept authority because they are affected by regulations and rules that are established at the workplace.

For example, two of the participants who experienced non autonomy mentioned:

'Well at work I am a follower because I have a manager and she decides things and for my former job there was no way you could say to the manager I don't do that because for this and this reason.'

'I'm a good doer, I'm not a good manager I would say. I don't set a lot of deadlines for myself because I have a lot of deadlines set for me already. When you have to meet those it's, well it happens, I mean if I have 5 projects going on at the same time I tell myself 'ok until the end of the day I will have to complete at least this much' I do that, but it is just to meet the deadlines that I already have, not that I set a deadline myself.'

Non-autonomy was perceived as motivation for self-regulated learning at the workplace in the sense that while accepting authority or obeying to the different norms already set at the workplace, the employees did not stop being autonomous and proposing alternative ideas and opinions at their workplaces when needed. Thus, non-autonomy sometimes worked as a trigger

for self-regulated learners especially when the norms and regulations at the workplace seem not to be the appropriate and employees have a different and innovative idea to suggest. As a result, even when non autonomy was mentioned it was often perceived as an opportunity for self-regulation and together with autonomy was influencing the way the employees regulate their learning at the workplace.

For instance, one of the participants mentioned:

'No I think I can handle that one. I think I can cope with authority, but in my work situations I always had quite a lot of authority myself, so it's ok for me to have a general path to walk on, but the details should be left for myself.'

In conclusion, perceived autonomy support, seen from the perspective of the basic needs in SDT, was mentioned as an important factor for the freedom of employees to set their own boundaries when they learn and work.

Table 5. *Quantitative overview of the responses per interview*

One variable mentioned	Number of respondents
Peer learning	1
Use of digital technology	1
Autonomy	-
Two variables mentioned	
Peer learning & Use of digital technology	15
Peer learning & Autonomy	-
Use of digital technology & Autonomy	1
Three variables mentioned	
Peer learning & Use of digital technology & Autonomy	21
Total	39

The qualitative overview of the responses presented above (Table 5), including the most frequently recurring patterns mentioned in the interviews of highly self-regulated learners, shows that most of the participants (N=21) used both learning strategies (peer learning and digital technology use) while being facilitated by autonomy provided by the workplace. To be more precise, communication and collaboration among colleagues when using peer learning,

search engines as a non-interactive type of technology use and autonomy support provided by the work environment with a focus on autonomy given by colleagues with a degree of authority form altogether the most fruitful combination. The reason of the importance of this combination from the perspective of the basic psychological needs that are introduced in the SDT is that it can better enable highly self-regulated learners to experience feelings of relatedness, competence and autonomy at the workplace simultaneously and at once.

For instance one participant mentioned:

'Sometimes yeah I think I'm quite independent thinker, yeah. I don't do things because my boss tells me to, yeah… Also it means you can get feedback from them which would mean that you might have to do something a little bit different, but I notice you get further…. So I'm getting more and more of these Skype meetings from home. Yeah and I don't think there are too many people doing that. So also I don't, like… so ICT for work, like last month I invited a group of colleagues for a webinar, so we sit together and do a webinar for nutritional development.'

Another important finding is that the two learning strategies (peer learning and digital technology use) were used in their combination by nearly half the participants which shows that the existence of the one learning strategy might be a prerequisite for the existence of the other (Table 5). In fact, the respondents' answers revealed that most of times they used digital technology so as to use peer learning at the workplace since technology made their communication with their colleagues easier.

For instance one participant mentioned:

'But on the other hand there are a lot of publications on the internet and one of the other things is that we have a 'kenniskring', special interest group within our organization about different subjects. So one of the subjects is curriculum and ICT and there we try to share different research about the topics. We also have forums, so every Monday is planning and

where we share our results and what are the new insights and also people who went to conferences and so on.'

6. Discussion and Conclusions

The aim of this current study was to identify how highly self-regulated learners work and learn at the workplace taking into account the basic psychological needs for relatedness, competence and autonomy as they are described in the SDT. The focus of this study was on the learning strategies the highly self-regulated learners use at the workplace and especially on the use of digital technology and peer learning. The role of perceived autonomy support provided by the workplace was also investigated. The method used included data from semi-structured interviews which were collected in 2014 by Dr. Anoush Margaryan. The researchers tried to identify common and frequently recurring workplace patterns concerning both the learning strategies and the perceived autonomy support in the interviews of the 39 knowledge workers.

Answering the following research question "*How do highly self-regulated learners fulfil their need for relatedness, competence and autonomy at the workplace?",* this study revealed that peer learning and digital technology (especially non interactive types of technology) as learning strategies, and the autonomy provided by the workplace in their combination were used by most participants in the context of their needs for relatedness, competence and autonomy. A great number of the respondents indicated also that they used both technology and peer learning. This finding might also suggest that technology use is sometimes a prerequisite for peer learning and is in line with previous research which showed that certain forms of peer learning like for instance help seeking is a beneficial strategy when peer learning takes place in technologically enhanced and self-regulated learning environments (Järvelä, 2011) and with the study of Keppell, Au, Ma, and Chan (2006), where technology use was also connected to different aspects of peer learning like assessment used among students so to grade their peers.

Focusing on the learning strategies from the perspective of the need for relatedness, peer learning was investigated and this study sought to reveal specific forms of peer learning

occurring at the workplace. The results revealed that most of the employees tend to learn through communication or collaboration with their peers. Advice or help seeking was also a frequently recurring pattern followed by the fact that a lot of knowledge workers had a coach or mentor at their workplaces. Boud and Middleton (2003), suggested that peer learning triggers informal learning opportunities and initiatives at the workplace where the individuals collaborate with their colleagues or even their seniors. Furthermore, in a recent study teachers were found to engage in informal learning effectively when interacting with their colleagues (Grosemans et al., 2015). In line with these findings, this current study suggests that highly self-regulated learners in contemporary organizations tend to learn from their peers and to take initiative to gain additional knowledge when needed by asking for others' opinion or help at the workplace. This means that peer learning as a learning strategy is used by employees who learn and work at their workplaces.

Concerning digital technology use, only one participant did not mention technology use and the most common types of digital technology were the non-interactive ones and especially the use of search engines and journals online. However, interactive types of digital technology use were also a highly recurring pattern, with a focus on social media use. The results showed that sometimes the same knowledge workers opt for a combination of both the interactive and non-interactive types of technology. A possible explanation of this two-folded finding could be the fact that technologically enhanced working environments have been developed during the last decades, hence the employees might feel more confident to search for additional knowledge online more often than working remotely or using web tools for collaboration with their colleagues. However, taking into consideration the fact that the participants are working both in the Netherlands and UK makes them by default more familiarized with technology use at the workplace due to high technology acceptance, flexibility and freedom for employees in both countries. More specifically, the Netherlands has the highest percentage of technology use with

70% of the employees (white collar workers) using computer technology and Great Britain follows with a considerable amount of employees using technology as well (Dhondt, Kraan, & Sloten, 2002). The study of Steffens (2006) revealed that technologically-enhanced learning environments seem to trigger individuals' initiatives to keep track on their learning progress and reflect on that using online tools offered by their learning environment. Moreover, Ellingson and Noe (2017) recognized technology use as a facilitator of an autonomous learning which promotes the online communication of employees at the workplace. In line with these two findings, this current study revealed that knowledge workers felt free to utilize all the sources for their learning provided online such as articles on journals or to search for information and knowledge through different search engines online. Furthermore, knowledge workers found to use social media to keep themselves up-to-date, to engage in peer learning and obtain additional information or knowledge when necessary. As a result, highly self-regulated employees used technology as a means to learn and work at their workplaces. Moreover, digital technology found to be linked to peer learning as well when it comes to the combination of strategies individuals choose to use at the workplace. This finding is supported by the study of Olgren (2000) where the employees were engaged in peer learning and controlled the sources provided by their workplaces.

Perceived autonomy support was mentioned as important concerning how highly self-regulated learners work and learn at the workplace but was also found to trigger the other two learning strategies used by the knowledge workers. A number of participants perceived non-autonomy at the workplace as an important pattern for of their SRL at work as well. This unexpected result shows that, despite the fact that employees tended to follow the norms, they did not miss the chance to express their opinion when they felt it was needed. In the study of Sierens, Vansteenkiste, Goossens, Soenens, and Dochy (2009), students required the autonomy support of the teachers so as to take initiatives concerning their learning and to get self-

reflection, self-evaluation and monitoring strategies that are triggered when they learn. Another study suggested that autonomy at the workplace is responsible for the arise of learning opportunities for employees by moderating the relationship between workload and opportunities for learning at work (van Ruysseveldt & van Dijke, 2011). The results of this study are in line with these two findings since the knowledge workers mentioned autonomy as a significant factor influencing the initiatives they take for their learning at work and specified autonomy mostly as the ability to take action and have their opinion heard even among work teams where there were superiors, managers or supervisors with more authority than them. Hicks et al. (2007) that an autonomous environment is the prerequisite for the choice of the right strategies which could trigger not only workplace learning but also its effective regulation by the individuals (Crouse et al., 2011). As a result, perceived autonomy support can be counted as an important trigger for the learning strategies used by highly self-regulated learners in this study (peer learning and technology use) in the general context for fulfilment of competence, relatedness and autonomy at the workplace.

To conclude with, the findings of this study revealed that highly self-regulated learners work and learn by using peer learning and technology as learning strategies, and autonomy support provided by the workplace and that all these together could help them to meet their basic needs after taking into account the SDT. The interviews that have been used, they are part of an innovative project using life history method for collecting qualitative data and offered some really important findings concerning Learning and Development (L&D) of employees which could be utilized by the organizations and specialists in the future.

7. Limitations and Future Recommendations

This current study tried to identify how highly self-regulated learners work and learn at the workplace using the perspective of the basic psychological needs as they are described in the SDT and providing the current literature on the relationship between SRL and SDT with a deeper insight concerning workplace context. However, there are some limitations to reflect upon which are going to be presented and discussed below.

First of all, through the sampling technique of this current study 39 individuals were selected and all of them were knowledge workers in private or public sector. Hence, the sample consisted of participants from almost the same workplace environments and sectors, making the findings of this study not highly generalizable (Bornstein, Jager, & Putnick, 2013). In addition, the way the interviews were conducted and the questions asked to the individuals included some overlap between work and learning thus making it difficult both for the interviewer and the interviewee to distinguish among the two and emphasize on (self-regulated) learning at the workplace. Additionally, concerning the method of this study, biographical interviews were used as a tool to identify the ways in which 39 highly self-regulated knowledge workers work and learn which could enable them to meet their needs for relatedness, competence and autonomy. Although life history method is an appropriate qualitative method so as to reveal experiences and opinions on a specific topic as previously mentioned, it is difficult to generalize its findings which include personal experiences about the lives of specific individuals (Germeten, 2013).

As a result, these limitations which are described above could set the ground for recommendations for future research. For example, instead of using the life history method, this study could provide some valuable results if a quantitative method will be used in the future. The benefits of a quantitative study would be that the researchers could get more accurate

results concerning all the four different variables included in this study (peer learning, digital technology use, perceived autonomy support and self-regulated learning) at the same time without being as costly option as a longitudinal study for instance. A quantitative study would also be suitable for the measurement of these specific variables together as the bias will be eliminated since the researchers will be at a distance from the subjects of the study, something that was not the case when using biographical interviews. Additionally, the generalizability of the findings could be higher by using quantitative method since the researchers would have the opportunity to include larger samples and compare their study with a greater number of previous researches on the same topic. In addition, new scales to measure SRL could also be developed in this new proposed quantitative method in order to foster the preliminary findings of the existing initial SRL@WORK questionnaire. New scales measuring whether highly self-regulated learners who use peer learning and technology while provided with autonomy indeed meet their basic psychological needs –competence, relatedness, autonomy- could add some practical results to this current study which used just the perspective of SDT so as to focus on working and learning at the workplace.

Finally, next to the learning strategies which are already investigated in this study, peer learning and use of digital technology, additional variables could be included so as to measure how highly self-regulated learners work and learn through the lens of the needs which are described in SDT at the workplace. For example, motivation as a new variable could provide with some interesting results in a future research since it has been already investigated at a school context (Jang, 2008). It would be also interesting to check in a future study if the strategies used for learning together and motivation of employees are again in their combination used for work and learn at the workplace from the perspective of the three basic psychological needs. Moreover, some workplace barriers against the regulation of learning of individuals could be added in the current study and investigate whether they could provide with some

important results against the current strategies employees use to work and learn and the provided autonomy support by the workplace (Crouse et al., 2011). Furthermore, future research could focus on the concepts of autonomy and non-autonomy at the workplace by investigating the different leadership styles from the perspective of hierarchy and decision making across different cultures. In that case sample could be larger including possibly managers and in general superiors of the employees. A combined study including the findings of the whole team project with the three life phases of the individuals (early childhood, school factors and adult working life) could also provide some noticeable results. Especially, a focus on the factors influencing SRL which might recur mostly in the other two phases (early childhood and school factors) and whether they are similar with both the strategies used at the workplace and autonomy might reveal interesting results. Finally, a combined study referring to all the three life phases could possibly include some personality traits. Personality traits could influence the ability of individuals to self-regulate their learning throughout their whole life but they are too stable and permanent till late adulthood to be influenced or altered so as to have an effect on how employees work and learn at an adult-working life phase (Johnson, McGue, & Krueger, 2005). However, in the case of a future study including also the other two life phases, it might be interesting to measure them as influencing factors towards SRL throughout the earlier life span of individuals before entering their adult working life phase.

8. Practical Implications

The findings of this present study on how highly self-regulated learners work and learn at today's contemporary work environments could be used as a suggestion for the L&D departments and HRD practitioners whose main goal - from the perspective of SDT - should be the satisfaction of the three basic psychological needs of employees competence, relatedness and autonomy. Moreover, the ways that employees learn at their workplace in 2016 presented in the graph of DEGREED, which was the inspiration for this study and was confirmed by its results, underline the importance of a supportive embracement of self-regulated learning by the organizations. Therefore, a useful practical implication for the organizations and L&D departments could be to promote a "social and searching approach" for employees' learning combined with the required autonomy support.

In fact, organizations could promote peer learning and technology use at the workplace not only practically by providing the means and equipment but also by supporting these strategies for learning and by giving the necessary autonomy to the employees. This means that apart from recognizing and promoting the current ways for professional development, such as trainings and courses, the organizations could actively promote and include peer learning and technology use as new learning strategies. In practice, this could be done by establishing successful online trainings where for instance social media could be used, a practice that is also proposed in the recent study of Dabbagh and Kitsantas (2005). Moreover, the organizations should facilitate peer learning online by promoting Communities of Practice (CoPs) and by using tools like Web 2.0 (Gunawardena et al., 2009). Concerning autonomy, the organizations could enhance the autonomy provided for the employees by changing the current learning culture and mentality of the HRD departments. Indeed, acceptance and autonomy support for individuals to choose the ways they work and learn at the workplace, could be beneficial for both the employees and the organization. In practice, organizations should build trust among

the employees by establishing a management system which permits employees to decide how to accomplish goals and which deals with mistakes at the workplace in an effective way. Moreover, the organizations should make the employees feel comfortable with ownership and responsibility regarding the tasks they undertake at the workplace as in this way they can feel more autonomous. This means that distributed leadership could be applied in the organizations where the tasks, activities and responsibilities will be spread among a number of employees and decision making will be independent from hierarchy norms at the workplaces. Finally, autonomy at the workplace can be promoted by encouraging creativity and giving employees the power to create their own paths concerning the ways they learn and work at the workplace.

In conclusion, although nowadays SRL seems to be preferred as a way of learning, the ways employees work and learn at the workplace can provide with some insight on how individuals could cover their needs for relatedness, competence and autonomy and how organizations could support this effort. The preferred learning strategies and the required autonomy support indicated by the employees in this current study should be taken into account by the L&D and HRD departments when creating and updating the current schemes for professional development in the context of their general endeavors to embrace new ways of learning at the workplace, such as self-regulated learning.

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Appendix: Coding Scheme

Variables	Theory driven labels	Data driven sublabels	Definitions	Examples
Peer learning	Team work	Sharing knowledge	The process of working together with colleagues in order to share knowledge with each other.	*'I always thought it was very important to work with people that I thought I could learn a lot from and that influenced who I wanted to work with.'*
		Task division	The process when team work is done in order to divide tasks among different colleagues at work.	*'Obviously there's a lot of networking and interaction and making sure that we understand who's doing what, so we would generally have a shared document in Google Docs and try to communicate through that what we're trying to do next...'*
		Communication/ collaboration	Team work is occuring in order to collaborate on a specific task or to communicate with the other colleagues concerning a job matter.	*'We can go to colleagues about more technical things. I go to institutes that are working on that topic for especially linked data and so I work together with people to develop knowledge in that area.'*
	Feedback	Giving	Individuals give some feedback to their colleagues concerning their work.	*'...checking that out on the web, feeding that back to the person you might be talking with to check your understanding and check whether*

				they have a different perspective.'
		Receiving	Individuals ask for some feedback from their colleagues concerning their work.	*'Also it means you can get feedback from them which would mean that you might have to do something a little bit different,..'*
	Advice/help	Giving	Individuals give advice or help to other colleagues concerning some difficulties they might encounter at their workplace tasks.	*'Yeah, so in terms of help giving I think I'm quite open for that, both with IBM and now in my research position. So I like that kind of exchange, especially now within research because I have relatively little contact with my colleagues of course because I'm in Vienna.'*
		Receiving	Individuals ask for advice or help to other colleagues concerning some difficulties they might encounter at their workplace tasks.	*'… so my main approach was just to ask others, especially the one senior consultant that was assigned to me.'*
	Role models	Colleagues	Colleagues, superiors or inferiors that work as inspiration for the employees to learn and to become better at their work.	*'But also through colleagues, same level colleagues and advanced colleagues …'*
		Superiors (bosses, managers, etc)		*'Mark as my promoter because he was a very good teacher, as a PhD teacher. So that was*

				really a very good choice, he taught me lots of things.'
		Inferiors (students, etc)		*'The contact with students, teaching them, asking questions, you trying to answer the questions, sometimes you have to look up things, so to be able to answer questions in a better way.'*
	Coaching/ Mentoring (coachee)		Coachee is the one who gets facilitated by others to achieve their full potential by offering support.	*'Well I've sort of been allocated with that they call research mentors, but because my research mentor is somebody I work with anyway, but we do have probably sit down meetings probably about twice a year now, about an hour to go over things and then I have one or two other people that sort of are happy to give me advice if I ask, in sort of mentoring way.'*
	Coaching/mentoring (coach)		Coach is the individual who support a learner (employee) in achieving a specific personal or professional goal by providing training, advice and guidance.	*'An intern and I was partly mentor, so that means that you have conversations of what is the progress or what are the problems? And you are a point where people can go to.'*

Use of digital technology	Interactive Types	Web tools for Communication	Individuals use online texting platforms or applications to communicate with each other.	*'In my daily work we use very much Google services, like Google Docs or Google Forums or Google Presentations...'*
		Remote work	Work at a different context mainly online.	*'The nature of the job you have to work in evenings and weekends because the students are all over the world, but I love it, I really, really enjoy it.'*
		Social media (Contributing user)	Individuals use the social media (Facebook, Twitter) in order to access knowledge and information for their learning. They can actively using the social media or just reading/browsing and not posting.	*'.. I set up a Facebook page for all the students and me as the placement facilitator, that they could reflect, when they were away from the university they could reflect on their experiences, you know to have a kind of online community when they weren't at university.'*
		Social media (Consuming user)		*For example I follow Twitter, I'm not that active, but I use it a little bit ...'*
		Forums (Contributing user)	Learners use forums to get answers to their questions or to get opinions on a topic. They can participate and discuss online in a group of people mainly about topics	*'We also tried to also for certain purposes to develop some common platform for some common ideas.'*
		Forums (Consuming user)		*'Oh I generally do not post things to forums, I generally look up other people's discussions.'*

			related to their work or they can just read comments of others online.	
		Blogs (Contributing user)	A user of a blog searches for information on a kind of website consisting of discrete, often informal diary-style text entries. Individuals can write actively or just reading blogs online.	*'…we found each other on the web on some news group and he turned out to live pretty close by…'*
		Blogs (Consuming user)		-
	Non Interactive types	Journals	The individuals access information and knowledge like publications, journals, articles and everything that an online library and databases can have.	*'But on the other hand there are a lot of publications on the internet and one of the other things is that we have a kenniskring, special interest group within our organisation about different subjects.'*
		Search engines	Individuals access all kind of information related to the content and context of their work at any time through the use of Internet at their workplace.	*'Just looked on the web. Everything's on the web.'*

	E-learning	-	Delivery of information and knowlegde through computers (e.g.e-courses, trainings, etc).	'Yeah, yeah there is, I think when I started, I would have gone to a lot of things like that, so learning how to use the university's student database and learning Word and Excel and things like that, then how to use things like Moodle, in fact just last week we were actually at a workshop to look at Mahara as an ePortfolio tool, but I've been using Mahara ..'
Perceived autonomy support	Autonomy	Flexibility in terms of planning/organising at work.	The freedom of an employee to determine the way of working in terms of planning and organising his/her work.	*'…it's very important to figure out what you're aiming for because when you go in and you have a lot of freedom and flexibility in many tasks it's easy to get lost in all of that. So you can end up spending a lot of time on tasks that are not really taking you in the direction that you need to go...'*
		Flexibility with colleagues who have authority/hierarchy at the workplace.	The freedom of an employee to determine his autonomous position at the workplace without thinking of hierarchy relationships.	*'So an authority figure is not something I've had a lot of experience in contending with. So I wouldn't say I'm dependent on that at all, I would say it's probably a new experience that I'm trying to figure out.'*

	Non autonomy	-	Obedience to colleagues with authority at the work settings. Lack of autonomy in the work settings, because of some regulations that employees obey to.	*'Well at work I am a follower because I have a manager and she decides things and for my former job there was no way you could say to the manager I don't do that because for this and this reason...'* *'I don't set a lot of deadlines for myself because I have a lot of deadlines set for me already.'*