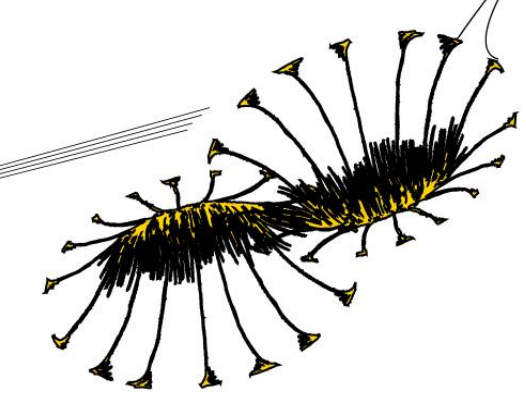




**Multiple-event measurement of self-directed learning:  
The interaction of personality traits and contextual variables on  
employees' daily self-directed learning fluctuation**



**MASTER THESIS**

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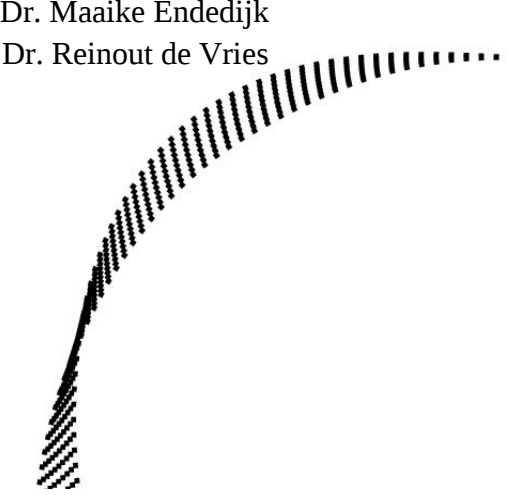
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## Abstract

Self-directed learning (SDL) has proved to increase employees' motivation and performance, as they are able to improve in work, and foresee upcoming changes that they need to adapt to. In contrast with previous studies, SDL was measured as an event, with a multiple-event measurement, as its definition denotes a dynamic aspect that evokes fluctuations. The current study investigated whether the interaction of the personality traits of conscientiousness and openness to experience and daily levels of workload, and work autonomy explain fluctuations of SDL. A longitudinal design with 15 measurement points for SDL and 5 for workload and work autonomy was adopted. Participants' SDL was measured by evaluating their reported daily learning activities in terms of their quantity and quality. Additionally, employees' SDL was expected to be higher on the beginning of the day and the week. SDL, workload and work autonomy were measured multiple times over a working week with a multiple-event instrument, in order to capture within-person fluctuations. The 49 participants of the study yielded in 488 reported learning experiences. The hypothesis that employees engage more in SDL activities at the beginning of the day and the week was confirmed only according to the quantitative aspect of SDL. Additionally, it was found that as the quantity of the SDL was gradually dropping the quality of it was increasing over the week. The interactions of conscientiousness and workload as well as openness to experience and work autonomy did not have a significant effect on SDL. Only openness to experience was found to have a main effect on the quantity of SDL. This suggests that people that are more open to experience tend to be more responsible about their development by engaging in more learning activities than others.

**Keywords:** self-directed learning, quantity, quality, fluctuation, multiple-event measurement, conscientiousness, openness to experience, workload, work autonomy

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## Introduction

As the world is changing, employees and organisations need to adapt by acquiring deeper and broader knowledge in order to improve their skills (Sessa & London, 2006; Tynjälä, 2008). Education acquired from schools and educational institutions, i.e. formal learning is not always adequate, as it is not completely adequate for upcoming advances and changes in the work field (Guglielmino, Guglielmino, & Long, 1987). Nowadays, workplace learning exceeds classroom boundaries and is more informal. Therefore, continuous learning is necessary and a way to achieve it is through promoting self-directed learning in the workplace (Guglielmino et al., 1987). According to Knowles (1978), individuals can be benefited in greater extents when their learning is adapted to their needs, interests and current level (Major, Turner, & Fletcher, 2006). Hence, the responsibility of learning as well as building up on existing knowledge and skills lies greatly on the employees themselves (Ellinger, 2004). They need to be proactive in the sense of identifying the discrepancies in their knowledge, finding and seizing opportunities to learn. Knowles (1975) defines self-directed learning (SDL) as the “process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes” (p. 18). Employees learn themselves and engage in learning activities that are not organised, structured and planned externally. On the contrary, self-directed learners fail to identify learning opportunities and engage in them. SDL can also be viewed by the perspective of the intention to learn. A learning experience can be planned, or unplanned, learning goals can be either pre-defined or not (Eraut, 2004). Thus, SDL can be measured from two perspectives, namely with the frequency they engage in learning activities and whether these activities are intrinsically planned, with pre-set goals, or not.

Raemdonck, et al. (2012), found that personal characteristics are more significant predictors of SDL than contextual ones. On the contrary, Eraut (2004) and Straka (2000) argue that organisations are not able to control for personal characteristics of employees. The reason behind that lies on the fact that, personality variables are more stable and permanent individual characteristics (Major et al., 2006)

when comparing to contextual aspects that can fluctuate. For example, although work autonomy was found not to have impact on employees' SDL (Raemdonck, et al. 2012), it could vary among various undertaken projects and tasks. A single measurement for stable personal characteristics can be sufficient for examining their influence on SDL. However, for contextual factors, namely teamwork, workload and work autonomy that often fluctuate over the day, more frequent measurement points are required in order to investigate their effect on SDL.

Regarding SDL, although it is considered a dynamic process that can be influenced by several factors (Pintrich, 2000; Zimmerman, 2000), existing literature has not broadly researched the dynamic nature of SDL (Moos & Azevedo, 2008). Most studies measure it as an aptitude, with an event-instrument (e.g. Raemdonck, et al., 2012), which denotes that SDL is a rather stable and enduring individual characteristic. However, as workplace learning is quite unplanned and depends highly on the context (Tynjälä, 2008), single measurements of both contextual factors and SDL are not able to provide reliable results. Although SDL has been investigated often over the literature, there is also a gap, as SDL is not quite researched in the micro-level, by providing more insight on specific SDL behaviours and practical indication of how SDL takes place (Aagten, 2016; Endedijk, Brekelmans, Sleegers, & Vermunt, 2015; Endedijk & Vermunt, 2013; Jolij, 2014). Exception are studies from Dannenberg (2015) as well as Endedijk and Bronkhorst (2014) where SDL in the micro level has been explored in specific contexts.

The current study measured SDL as an event that fluctuates over time, in a variety of contexts, both in its quantity and quality. Therefore, the purpose of the study is to investigate the interaction effect of individual characteristics, namely personality traits of conscientiousness and openness to experience as well as the contextual characteristics, namely the daily levels of workload, and work autonomy influence employees' SDL. By deploying a multiple-event measurement tool, it aimed to capture the differences in the daily learning experiences of employees from various working contexts. In order to realise this goal, the research is initiated with a theoretical conceptual framework, where an overview of the variables and their interrelations is presented. Based on this, several hypotheses and research questions are formulated. Subsequently, the research method, instrumentation and data

collection method are explained. This research comes to an end with analyses of the collected data as well as a discussion of the results.

## **Theoretical Conceptual Framework**

### **Self-directed Learning**

SDL and its benefits have discussed excessively in the literature. According to Raemdonck (2006), self-directed learners are able to direct their learning and overcome potential learning challenges in order to reach their goals. Pintrich (2000) identifies SDL's dynamic aspect as an "active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate and control their cognition, motivation and behaviour, guided and constrained by their goals and contextual features in the environment" (p. 453). Therefore, people who identify opportunities for learning in the workplace, take advantage of them and keep being persistent when facing difficulties, are being qualified as employees with high levels of SDL (Raemdonck, et al. 2012). Thus, it seems that SDL can be influenced by both contextual and individual factors. In that case, it needs to be measured with multiple-event measurement instrument which captures the fluctuation of the variable, as it is measured exclusively for each undertaken learning task. Based on the dynamic aspect of SDL, it is expected to fluctuate over time.

This study investigates SDL by looking it through two perspectives. Learning can be viewed either from the perspective of quantity or quality. The first perspective, examines the quantity of the learning experience. Raemdonck (2006) argues that SDL can reach various levels based on the context. Tynjälä (2008) argues that learning in the workplace can be either planned or unplanned and can happen. Since, SDL is defined by Raemdonck, et al. (2012) as the identification and exploitation of learning opportunities in the context, it can be expected that employees number of learning experience can differ. Seibert, Kraimer, and Crant (2001) argue that employees that demonstrate low levels of SDL, their behaviours are antithetical than those who are highly self-directed. More specifically, low or no self-directed learners do not engage in learning activities as well as fail to exploit learning opportunities. Essentially, in a context that offers various learning resources, each individual will engage in different more or less learning activities. In that sense, SDL is viewed through a quantitative perspective. In the current research, SDL would be addressed by both the qualitative

and quantitative perspective by measuring the level of employees' goal setting and goal orientation as well as the number of reported learning experiences.

The second view of SDL is its quality. According to the model of Pintrich (2000) and Zimmerman (2000), each learning experience which the learners engage in and is considered to be self-directed, entails three main phases, namely forethought, performance and self-reflection. More specifically, this means that learning can be either planned or unplanned (Eraut, 2004). Additionally, learning in the workplace can be deliberate, meaning that individuals can pre-set their learning goals and time allocation for achieving these goals, can be reactive where there is not enough time, or implicit, namely unconscious (Eraut, 2004). Practically, in deliberate learning employees have the ability to predefine their learning goals as well as the reasons why these goals should be met. In sum, learning can be unplanned, planned but without a clear intention, or planned with pre-set and predefined goals. Following this distinction, in this study, SDL was measured by the intention of employees to learn.

Regarding workplace learning, time is very significant factor that can influence the extent to which employees engage in learning activities. In a case study of teachers, it was found that lack of time in their work inhibits them to take actions for their professional development (Lohman, 2000). However, in order for employees to set the goals for learning as well as learn in general, time and effort allocation are required. As the beginning of the day and the week fulfils these conditions more than at the end of them, it is expected that employees can engage more in SDL activities in the beginning of the day and the week.

## **Influencing Factors**

**Personality Traits.** Personality traits refer to certain stable individual characteristics that differ for each person, and are depicted into their behaviour, emotions and cognitions (Hogan, Hogan, & Roberts, 1996; Major et al., 2006). Previous literature quite often connects proactive personality with learning. In the research of Raemdonck et al. (2012) it was found that people with proactive personality tend to be self-directed learners. The personality model HEXACO was developed as an extension and improvement of the Big Five model, and depicts more accurately the construct as well as explains some significant personality variance that was not found in the Big Five framework (Ashton, Lee, & de Vries, 2014). The HEXACO model has

six personality traits, namely Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience. According to Major et al. (2006), conscientiousness and openness to experience are significant predictors of motivation to learn. More specifically, personality characteristics were found to enhance learning in more significant manner, especially when contextual factors tend to provide little support for or even hinder learning (Major et al., 2006). To our knowledge, the other four personality traits of the HEXACO model, namely Honesty-Humility, Agreeableness, Extraversion and Emotionality are not connected either with SDL or learning in general. Therefore, they were not taken into consideration for this research.

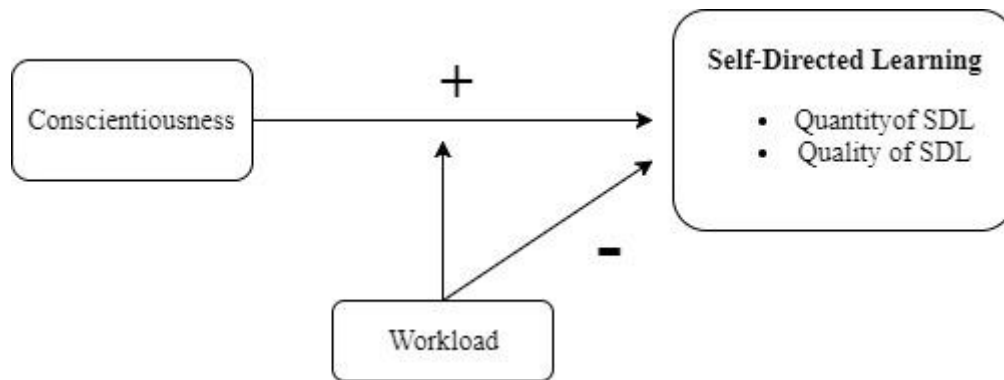
As learning is always taking place in an environment which entails various factors that can either enhance or hinder it, it is something that should also be considered. The Trait Activation theory explains that although people can have some personality traits more prominent than others, they do not act the same way in all situations (Tett & Guterman, 2000). This means that situations that people are in can enhance the activation of certain personality traits (de Vries, Tybur, Pollet, & van Vugt, 2016). More specifically, while being in the workplace, the need to complete a task or a project it activates more the personality trait of conscientiousness. Moreover, the personality trait of extraversion is less likely to be activated when working from home, as it is mostly a situation that requires individual work. According to de Vries, Tybur, et al. (2016) people tend to choose situations in which their personality traits can be activated. In the following sections it is discussed whether situations with high workload and work autonomy can interact with the personality traits of conscientiousness and openness to experience could influence employees' SDL.

**Conscientiousness and Workload.** People with high *conscientiousness* tend to be hardworking, devoted, and reliable (McCrae & Costa, 1987) which leads to high work performance and achievement (Christian, Garza, & Slaughter, 2011). Conscientious individuals tend to be well organised and self-disciplined (Dinger et al., 2015). Therefore it can be argued that the natural sense of duty they have, would drive to pursue accuracy and would allocate more time and effort in their work (Dinger et al., 2015). According to Major et al. (2006), conscientiousness is the “tendency to be

purposeful, organized, reliable, determined, and ambitious” (p. 928). Concrete behaviours that conscientious people engage in are the persistence, dependability, responsibility all directed into achievement (Bidjerano & Dai, 2007). In previous research, conscientiousness was found to have a strong relation with motivation to learn (Colquitt, LePine, & Noe, 2000).

*Workload* is defined as the amount of time that is required for certain tasks to be completed (Lawless, 2010). However, due to the difficulty of finding a single measurement that can objectively determine the level of workload, most instruments measure it with self-reports of perceived workload (Kyndt, Dochy, Struyven, & Cascallar, 2011). In previous research, workload seems to associate with learning. In some studies it was shown that workload has a positive impact on learning-related outcomes (Rau, 2007; Skule, 2004) in others no association was found (Houkes, Janssen, de Jonge, & Nijhuis, 2001; Morrison, Cordery, Girardi, & Payne, 2005), whereas there are also some studies that proved a negative influence (Parker & Sprigg, 1999; Taris, Kompier, de Lange, Schaufeli, & Schreurs, 2003). High workload seems to have a positive influence on learning, as it can trigger individuals to explore new and more effective ways to achieve and fulfil work related tasks (van Ruysseveldt & van Dijke, 2011). Kemper (2004) found that students that perceived their workload as high, tended to resort to surface learning as they could not cope with the excessive amount of stress and work that had to undergone. Concerning workplace learning, the acquisition of new knowledge and skills in the workplace can be hindered due to high level of workload (Karasek & Theorell, 1990). According to action theory of (Frese & Zapf, 1994), it can be argued that high levels of workload can hinder intention of learning and result in automated behaviour due to task regulation disturbance (Taris & Kompier, 2005). In order to let SDL emerge, people need time, freedom and low levels of stress. In that way they will be able to identify current discrepancies in skills and knowledge as well as find ways to eliminate them by setting the necessary learning goals. In fact, when employees have high levels of workload, the main purpose becomes to their task completion. In those cases, there is no time for reflection, exploration and experimentation, which are significant components of workplace learning (van Ruysseveldt & van Dijke, 2011). Therefore, it seems that high workload can hinder the process of SDL to be evoked. When considering the personality trait of conscientiousness, where people tend to be diligent

and dutiful in their work, they are expected to complete their everyday tasks anyway (Bidjerano & Dai, 2007). However, their learning activities are expected not to be self-directed due to the high workload of that day.



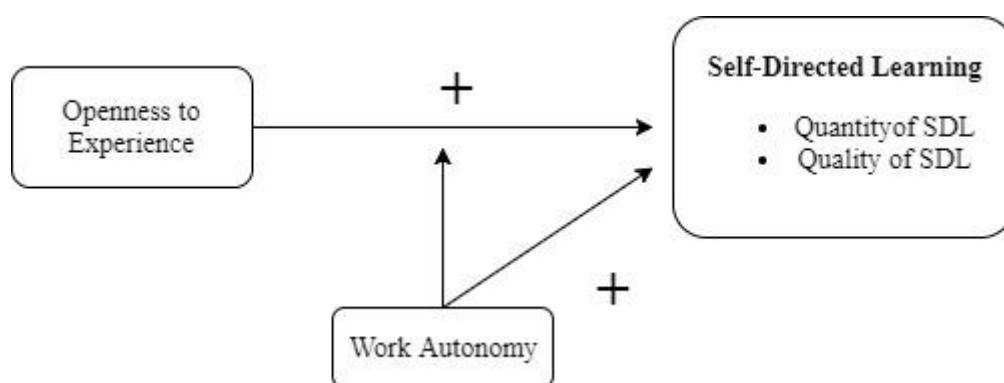
**Figure 1. Schematic representation of hypothesis 3**

### **Openness to Experience and Work autonomy**

*Openness to experience* is defined “as an active investment of energy in the idea domain” (de Vries, Wawoe, & Holtrop, 2016, p. 179). People that are open to experience tend to be innovative, unconventional, intellectual and creative, as well as engage in situations where there are opportunities for new experiences (Weller & Tikir, 2011). Moreover, they enjoy positioning themselves in situations that allow them to discover new things and have new experiences (Weller & Tikir, 2011). According to Pace and Brannick (2010), individuals that are open to experience can be suitable for workplace contexts, that continuously and quickly changing, due to their ability to come up with innovative solutions. Additionally, openness to experience facilitates already existing subject matter knowledge with new creative ideas (Pace & Brannick, 2010). Lounsbury, Levy, Soo-Hee, Gibson, and Smith (2009) argue that openness to experience characterizes greatly self-directed learners, as they tend to set goals for themselves and try to overcome them (Lounsbury, Gibson, & Hamrick, 2004).

*Work Autonomy*: According to Raemdonck, et al. (2012) work autonomy is defined as the “degree to which the job provides substantial freedom of judgment to the employee in scheduling work and determining the procedures to be used” (p. 581). Kohn and Schooler (1982) argue that strict supervision that restricts freedom in work and hinders SDL behaviour. However, work autonomy has not been proven to predict SDL (Raemdonck, et al. 2012). This seems to lie on the fact that it is measured once

as a stable contextual characteristic. However, as employees undertake an array of projects and tasks throughout their week, measuring it once does not provide reliable results. Therefore, it should be measured on a daily level in order to investigate how it interacts with personality traits, as well as their effect on SDL. Van Ruysseveldt and van Dijke (2011) argue that when work autonomy is low, employees are not able to utilize learning opportunities, as there is no freedom to do so. Since high levels of openness to experience relate to high imagination and cognitive processes, being autonomous in work will allow people to feel free to allocate time to go through the phases of SDL.



**Figure 2. Schematic representation of hypothesis 4**

## Research Questions

Based on the literature mentioned above, this study aims to provide a better insight on the extent to which the employees' SDL can fluctuate over time due to the interaction of individual and contextual variables. In order to guide this research, the following main research question was formulated;

**To what extent does the interaction of personality traits and contextual factors explain fluctuations of self-directed learning during the week?**

More specifically, and so as to be able to answer this main research question, the following sub-questions and corresponding hypotheses were formulated;

1. To what extent does employees' self-directed learning fluctuate during the day?

Hypothesis 1: It is hypothesized that employees will engage more in self-directed learning activities at the beginning of the day and less at the end of the day.

2. To what extent does employees' self-directed learning fluctuate over the week?

Hypothesis 2: It is hypothesized that employees will engage more in self-directed learning activities at the beginning of the week when comparing to the end of the week.

3. To what extent employees' self-directed learning is influenced by the interaction between their level of conscientiousness and daily levels of workload?

Hypothesis 3: Employees scoring high on conscientiousness will engage more in self-directed learning activities when the daily level of workload is low.

4. To what extent employees' self-directed learning is influenced by the interaction between their level of openness to experience and daily levels of work autonomy?

Hypothesis 4: Employees scoring high on Openness to Experience will engage more in self-directed learning activities when the daily work autonomy is also high.

## **Method**

### **Research Design**

The current study aims to investigate how the interaction of individual and contextual factors influences within-person fluctuations of employees' SDL. Thus, it is denoted that it is a correlational study, with longitudinal elements that aimed to determine the relation between variables. More specifically, a within-person multiple-event design is suitable to capture the differences of the reported learning experiences. This type of design aimed to capture individual differences of respondents overtime, which also

requires a more intensive measuring method (Hamaker, 2012). This design broadens and deepens the insight of workplace and self-directed learning in various contexts, as data was collected daily.

## Respondents

The current study aimed at collecting data on the individual, daily and event level. In order to achieve an as equal distribution as possible, employees from various countries, age, working fields, and functions were approached. For achieving this, sampling was conducted through a snowball sampling method. More specifically, respondents were attracted through personal contacts of the members of the research team and via LinkedIn. Due to the fact that the study required a considerable amount of effort and time allocation from the participants, a fairly low response rate as well as dropout were expected. Therefore, distributing the questionnaires through email enabled more participants from all over the world to be approached. Additionally, no strict requirements were set, apart from the fact that respondents should be working adults. In total, 62 employees were either personally invited to participate in the study or showed interest after seeing information about the study online. After conducting two rounds of data collection, the total number of participants that answered at least one of all the available questionnaires was 49 (response rate= 79.0%). Of them, 46 filled in the General Background Questionnaire (response rate= 74.2%), and 45 filled in at least one learning experience (response rate= 72.6%). As the information extracted from their learning experiences is necessary for addressing all hypotheses, the 4 participants that did not fill in any of the learning moments were excluded from the data analyses. However, for persons that did not fill in the General Background questionnaire but several learning moments, their data were used for addressing hypotheses 1 and 2. Eventually, 488 learning moments were reported (response rate= 66.4%), which results in an average of 10.8 reported learning experiences per person.

The following descriptive statistics regard the sample of 46 participants, as this data were provided from the General Background Questionnaire. In this study, 31 women (67.4%) and 15 men (32.6%) participated. The mean age was 39.1 (SD= 12.2, 12 missing values). The majority of the sample had already obtained a Bachelor (41.3%) or a Master degree (50.0%). Most of the participants worked in Greece (45.7%) or the Netherlands (23.9%), and the rest 24.4% in Germany, USA, Indonesia,

India, Ireland, New Zealand and Belgium. Concerning the sector in which the participants were working, 19 participants were from the teacher training and education (41.3%), 8 from public services and administration (17.4%), 4 business, consulting and management (8.7%), 4 from information technology (8.7%), and the rest from accountancy, banking and finance, engineering and manufacturing, healthcare, hospitality and events management, recruitment and HR as well as research institutes. On average, the participants had 18.4 colleagues ( $SD=32.7$ ) and according to their contract, they worked on average 31.1 hours per week ( $SD=11.9$ ). The vast majority of the participants worked on a fixed term contract (56.5%) or open-ended contract (28.3%). 4 participants worked as freelancers, 2 as temporary workers and 1 is a doctoral student. From the whole week of data collection, 39 respondents were planning to work on Monday (79.6%), 43 on Tuesday (87.8%), 41 on Wednesday (83.7%), 42 on Thursday (85.7%) and 42 on Friday (85.7%). A more detailed overview of the demographic characteristics of the participants can be found below (Table 1).

**Table 1.**

*Overview descriptive statistics respondents' demographic characteristics.*

| Variable  | Mean | Categories           | Percentage | SD   |
|-----------|------|----------------------|------------|------|
| Gender    |      | Male                 | 32.6%      |      |
|           |      | Female               | 67.4%      |      |
| Age       | 39.1 |                      |            | 12.2 |
| Education |      | Primary school       | 0.0%       |      |
|           |      | High school          | 4.3%       |      |
|           |      | Vocational Education | 2.2%       |      |
|           |      | Bachelor             | 41.3%      |      |
|           |      | Master               | 50.0%      |      |
|           |      | PhD                  | 2.2%       |      |
| Country   |      | Netherlands          | 23.9%      |      |
|           |      | Germany              | 8.7%       |      |
|           |      | Greece               | 45.7%      |      |

|                              |                                     |       |
|------------------------------|-------------------------------------|-------|
|                              | USA                                 | 6.5%  |
|                              | Indonesia                           | 2.2%  |
|                              | India                               | 4.3%  |
|                              | Ireland                             | 4.3%  |
|                              | New Zealand                         | 2.2%  |
|                              | Belgium                             | 2.2%  |
| Sector                       | Accountancy, Banking and Finance    | 4.3%  |
|                              | Business, Consulting and Management | 8.7%  |
|                              | Engineering and Manufacturing       | 4.3%  |
|                              | Healthcare                          | 4.3%  |
|                              | Hospitality and Events Managements  | 2.2%  |
|                              | Information Technology              | 8.7%  |
|                              | Public Services and Administration  | 17.4% |
|                              | Recruitment and HR                  | 4.3%  |
|                              | Teacher training and Education      | 41.3% |
|                              | Research Institutes                 | 4.3%  |
| Current<br>Work<br>Situation | Payroll (fixed term contact)        | 56.5% |
|                              | Payroll (open-ended contract)       | 28.3% |
|                              | Freelance worker                    | 8.7%  |
|                              | Obtaining a doctoral degree         | 2.2%  |
|                              | Temporary/stand-by employee         | 4.3%  |
| Number<br>of<br>colleagues   | 18.4                                | 32.7  |
| Working<br>hours             | 31.1                                | 11.9  |
| Work<br>days                 | Monday                              | 79.6% |
|                              | Tuesday                             | 87.8% |

|           |       |
|-----------|-------|
| Wednesday | 83.7% |
| Thursday  | 85.7% |
| Friday    | 85.7% |

### Instrumentation

In this research, the data were collected by deploying three different questionnaires in order to examine the interaction effect of personal and contextual factors on employees' level of SDL. Below the various measurement tools are elaborated as well as information concerning which variables are being measured are determined. All three measurements were in the form of questionnaires, which were created in, distributed and collected via the Qualtrics research software.

**General Background Questionnaire:** By distributing this questionnaire, data for the participants' *demographic characteristics* and *personality traits* were collected. This questionnaire had several functions. The first page served as an informational page, where participants got a better and more detailed insight about the nature of the study, its purpose and the steps that they would have had to follow. The second page of the questionnaire functioned as inform consent. There, the participants received information about the way the data would have been handled as well as about their ability to withdraw their participation at any point of the study. Questions for demographic characteristics regarding respondents' age, gender, educational level, working sector, function, working days, working situation, contract working hours, as well as number of colleagues were added. Data collected from these questions provided information about the participants' background and working context as well as the level of the heterogeneity of the sample. Nevertheless, these data were not taken into account for answering the hypotheses.

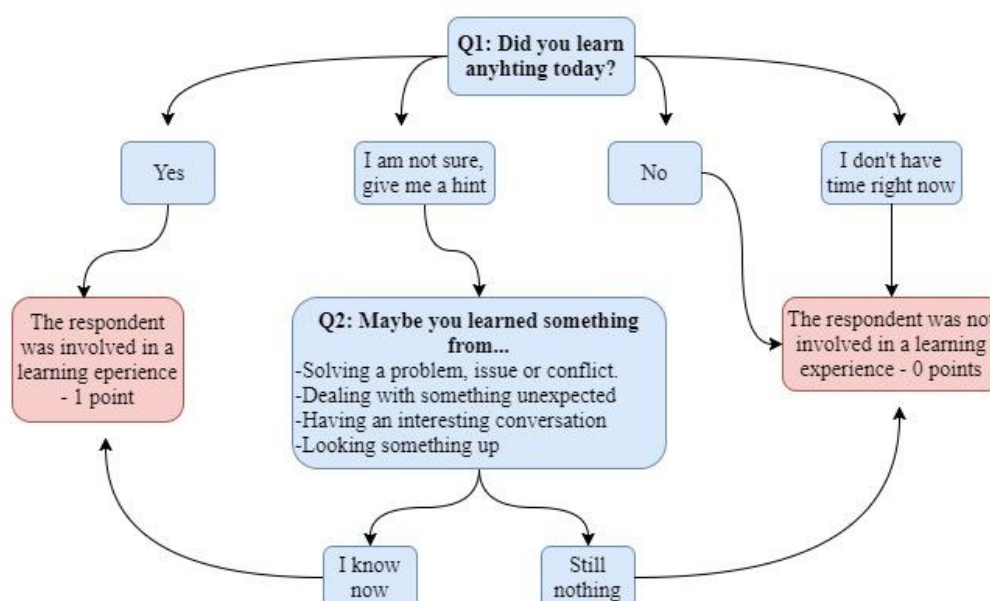
In order to measure the employees' personality traits, the HEXACO-100 questionnaire was deployed, which is widely used in the literature of personality research (Lee & Ashton, 2016). Comparing this questionnaire with the similar HEXACO-60 and HEXACO-200, it was found that this one has high validity as well as high correlations with the latter two (Lee & Ashton, 2016). HEXACO-200 is suitable for studies that aim to measure also participants' scores of the personality facets, whereas HEXACO-60 should be distributed when participants are under time

constraints (Lee & Ashton, 2016). As the current research is interested in measuring the main personality traits and as it was expected that the participants would not be under considerable time pressure, the HEXACO-100 was the most suitable measurement tool. The HEXACO-100 is comprised of 100 items that measure all 6 personality traits. Example items are: for honesty-humility “I am an ordinary person who is no better than others”, emotionality “I sometimes can’t help worrying about little things”, extraversion “the first thing that I always do in a new place is to make friends”, agreeableness “I tend to be lenient in judging other people”, conscientiousness “I often check my work over repeatedly to find any mistakes”, and openness to experience “I like hearing about opinions that are very different from those of most people”. For each personality trait the questionnaire includes 16 questions. The higher or lower an individual scored in each of the six domain factors indicated a corresponding higher or lower level in that personality trait. For an overview of the questions entailed in this questionnaire see Appendix A. Taking into account the fact that the current research is interested only on the personality traits of Conscientiousness and Openness to Experience, the data obtained for the other four personality traits were not used.

**Learning Moments:** Learning Moments were called the questionnaires that were created in order to record participants’ learning experiences, learning activities, and learning intentions. Each learning experience that the respondent engaged in and reported it was considered a learning moment. More specifically, data generated from these questionnaires were addressing the variable of *self-directed learning*. The included questions were based on and adapted from the Structured-Learning Report of Endedijk et al. (2015). The Learning Moments offered the opportunity to measure repeatedly the employees’ learning experiences and activities three times per day for five consecutive working days, leading to up to 15 measurements per person. More specifically, an email was received, asking to fill in a learning experience that occurred that specific period of the day, as well as the learning activities and intention of that experience. The questionnaire originally consisted of 10 questions, however, depending on the respondents’ answers, it could be shorter (Appendix B). Therefore, the time needed for completing the Learning Moments varied. The questionnaire included one open answer question, where the learning experience could be indicated and elaborated, as well as 9 multiple choice questions. In case the respondents did not

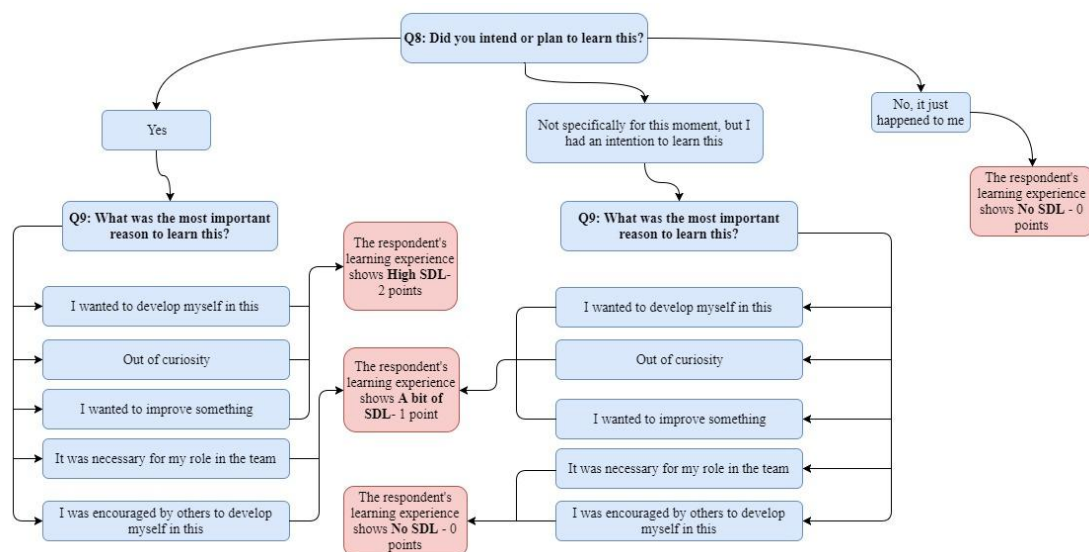
learn anything new or lacked time to fill in the Learning Moment they could indicate it in the first question and then the questionnaire was directly finished.

As elaborated also in the conceptual framework, the variable SDL was measured in two ways. Concerning the first way of measuring SDL, namely by its quantity, only the number of learning experiences that each respondent indicated, was guide to measure their level of SDL. To put it another way, in order to measure SDL quantitatively, SDL was defined as the fact that employees indeed learn in their work, as well as take the responsibility to actually engage in a learning experience. More specifically, the first question from the questionnaire asked the participants, whether they learned anything. For this question (Q1), there were the following four possible options: “yes”, “I am not sure. Give me a hint”, “no”, and “I don’t have time right now”. In case of choosing the two last options, the questionnaire was terminated. When participants were not sure, a hint was given to them, with situations in which a learning experience could be generated. After this, the participants had to indicate whether they could report then if they learned something or not (Q2). Overall, when participants reported a learning experience either ‘yes’ in Q1 or ‘I know now’ in Q2, was an indication that they are self-directed, as they report that they learned. Therefore, based on this, a distinction was made where people that report a learning experience received the value 1, whereas those who did not report a learning experience, because they did not engage in one, received the value 0 (Figure 5).



**Figure 3. Flowchart demonstrating the way quantity of SDL was measured.**

The second way of measuring SDL, namely its quality, was reflected by the questions 8 and 9 of the questionnaire, which, according to Zimmerman (2000) and Endedijk et al. (2015), address the forethought phase of SDL. In that way, what is measured not simply how many times employees are learning throughout their day and week but the quality i=of these learning experiences. For measuring the planning of the learning experience (Q8), the participants had to indicate whether their learning experience was planned, unplanned or whether there was a wish to learn. In case of choosing one of the first two options, they had to justify the reason for planning the experience, namely the learning goal orientation (Q9). In order to determine employees' SDL, this variable has to be ordered categorically into three levels. Following Aagten's (2016) distinction and for investigating employees' fluctuation of SDL, each reported learning experience was evaluated as an experience that was highly self-directed (self-initiated), a bit self-directed (when it is mostly externally initiated and not consciously planned and undertaken) or no self-directed. Taking into account the two questions in the Learning Moment questionnaire (Q8, 9) that measure planning and learning goal orientation, respondents can score maximum two points for each learning experience in order to be considered highly self-directed. Scoring one point indicates that the learning experience is a bit self-directed; zero points indicate that the respondents engaged in a learning activity that was not self-directed (Figure 6).



**Figure 4. Flowchart that demonstrates the measurement of the quality of SDL.**

**Workday Overview:** This questionnaire measured the contextual variables of *workload*, and *work autonomy* on the daily level. More specifically, by the end of each day, participants were asked to evaluate the daily levels of workload, work autonomy and teamwork. Work autonomy was measured with the Likert scale question “today my job gave me considerable opportunity for independence and freedom in how I do my work, a valid scale adapted from Raemdonck (2006). Workload was measured by the following Likert scale question “today my workload was high”. Both questions were ranging from 1=totally disagree to 5=totally agree. The importance of this questionnaire was highlighted to the participants by indicating that the information provided here would be crucial for the research. Additionally, they were instructed to fill it in as accurately as possible and regardless of the number of learning experiences they had reported that day. This questionnaire was also sent via email.

## **Procedure**

Prior to data collection, the study was approved by the Ethic Commission of University of Twente. All respondents participated contentiously and were fully informed for its purpose, design and terms of participation. Additionally, they were informed about their ability to drop out of the study at any point. More specifically, the three different types of questionnaires were explained, namely the General Background Questionnaire, Learning Moments and Workday Overview. Furthermore, the participants were informed about the number of questionnaires that they would have to fill in as well as when they would receive them. As the research followed a within-person design, initially; the data were collected non-anonymously, in order for the answers from the two measurement instruments to be matched. More specifically, the participants’ email was asked and used in order to for the questionnaires to be sent to them. After the completion of the data collection, the data were processed and analysed completely anonymously.

In order to attract a sufficient number of participants, information about the research and opportunities for participation were posted in the LinkedIn profiles of the research team. Personal contacts of the research team were deployed for attracting more participants. Additionally, participants that confirmed their participation were also asked to distribute or introduce the study to colleagues or acquaintances that

could potentially be interested in participating. The study followed two phases (Table 3).

**Table 2.**

***Overview of data collection procedure.***

| 4-5 days before          | Monday           | Tuesday          | Wednesday        | Thursday         | Friday           |
|--------------------------|------------------|------------------|------------------|------------------|------------------|
| General                  | 11.00            | 11.00            | 11.00            | 11.00            | 11.00            |
| Background Questionnaire | Learning Moment  | Learning Moment  | Learning Moment  | Learning Moment  | Learning Moment  |
|                          | Monday 1         | Tuesday 1        | Wednesday 1      | Thursday 1       | Friday 1         |
|                          | 12.00            | 12.00            | 12.00            | 12.00            | 12.00            |
|                          | Reminder         | Reminder         | Reminder         | Reminder         | Reminder         |
|                          | 13.30            | 13.30            | 13.30            | 13.30            | 13.30            |
|                          | Learning Moment  | Learning Moment  | Learning Moment  | Learning Moment  | Learning Moment  |
|                          | Monday 2         | Tuesday 2        | Wednesday 2      | Thursday 2       | Friday 2         |
|                          | 14.30            | 14.30            | 14.30            | 14.30            | 14.30            |
|                          | Reminder         | Reminder         | Reminder         | Reminder         | Reminder         |
|                          | 16.00            | 16.00            | 16.00            | 16.00            | 16.00            |
|                          | Learning Moment  | Learning Moment  | Learning Moment  | Learning Moment  | Learning Moment  |
|                          | Monday 3         | Tuesday 3        | Wednesday 3      | Thursday 3       | Friday 3         |
|                          | 17.00            | 17.00            | 17.00            | 17.00            | 17.00            |
|                          | Reminder         | Reminder         | Reminder         | Reminder         | Reminder         |
|                          | 17.15            | 17.15            | 17.15            | 17.15            | 17.15            |
|                          | Workday Overview | Workday Overview | Workday Overview | Workday Overview | Workday Overview |
|                          | Monday           | Tuesday          | Wednesday        | Thursday         | Friday           |
|                          | 17.45            | 17.45            | 17.45            | 17.45            | 17.45            |
|                          | Reminder         | Reminder         | Reminder         | Reminder         | Reminder         |

Firstly, four to five days before the initiation of the study, the respondents were asked to complete the General Background Questionnaire. The second had the

duration of 5 working days (Monday through Friday) when the participants received 3 times per day one Learning Moment. They were sent on the preset hours of 11.00, 13.30, and 16.00 CEST. By the end of each working day, namely at 17.15 CEST, the participants received the Workday Overview questionnaire of the day, in order for the contextual variables to be measured. After one hour of sending each questionnaire, a reminder was sent via email to each participant that did not complete the questionnaires. In that way, the chance of participants' not filling in the questionnaires and resulting in a low response rate was minimised. Concerning the participants living in different time zones, they were instructed to fill in the questionnaires by providing answers corresponding to the days and times that the questionnaire refers to. In order to yield a satisfactory number of participants, the data collection was conducted two times. After the completion of both rounds, an email was sent to each participant, regardless of the amount of completed questionnaires, in order to demonstrate the appreciation of their contribution and allocation of time allocation one the study.

## Data Analyses

Generated data were quantitative as the variables are both continuous and categorical, and were analysed quantitatively on SPSS version 24. Apart from the statistical analyses explained below, schematical representations will provide a clearer overview of the fluctuation of the variables over the week.

*Hypothesis 1.* In order to test whether participants were more self-directed at the beginning of the day than at the end of it, several processes had to be undertaken. Based on the Instrumentation section above, two variables needed to be created, namely the quantity and quality of SDL, in order for the two ways of measuring SDL to be addressed. From the Learning Moments questionnaire, questions 1 and 2 were coded in order to create the variable quantity of SDL, in order to check in how many learning experiences respondents engaged in throughout their working day and week. Additionally, questions 7 and 8 were coded in order to create the variable quality of SDL, and explore the level of self-directedness of the respondents' learning experiences. Subsequently, a mean score for all three measurement points (beginning, middle and end of the day) were calculated. As not all participants provided information for all the 15 learning experiences, apparently there was quite an amount of missing values. Not filled in questionnaires were treated as missing values, as the participants did not provide any information about their learning experiences for that

point in time. This means, for example that in order to calculate the average score of the beginning of the day learning experiences, the sum of the scores was divided not by the number of possible maximum learning experiences, but by the number of the actual reported ones. For example, a participant that reported all morning learning experience and scored 2 in all of them, his/her average beginning of the day score was 2 ( $(2*5)/5=2$ ). Whereas if someone, reported only 4 out of the 5 days the morning learning experience, again with value 2 in all of them, he/she would have again an average score of 2 for the beginning of the day ( $(2*4)/4=2$ ). After calculating all three mean scores, a one way ANOVA with post-hoc Bonferroni test was conducted to see the differences in the mean scores of SDL at the beginning, middle and end of the day. In order to achieve this, the original data set was restructured so that each participant had one row for each measurement of the day.

*Hypothesis 2.* In order to examine whether employees' engage more in self-directed learning activities at the beginning of week and less at the end of the week, an average score from the learning moments of each day was calculated. In this study, for the beginning of the week the average scores of all learning experiences of Monday and Tuesday were taken into consideration whereas the average scores of the learning experiences of Thursday and Friday were considered to be the end of the week. Again, SDL is measured with the same two ways as in hypothesis 1. Additionally, the calculation of the average scores followed the same process as in the previous hypothesis. As the two measurements were from same participants, in order to compare the means of the beginning and end of the week, a paired t-test was conducted for both ways of measuring SDL. The conducted paired t-test provided statistical information about the mean difference between the paired observations on SDL.

*Hypotheses 3 and 4.* In order to calculate participants' personality traits, namely conscientiousness and openness to experience, several items of each scale were reversed. For addressing the remaining hypotheses, linear regression analyses were conducted to determine the interaction effect of personality traits and contextual variables on employees' quantity and quality of SDL. Prior to this, correlational analyses among the variables were performed. Regression analyses of the main effect of the independent variables on the dependent ones were also conducted. The regression analyses with conscientiousness and openness to experience as

independent variables were performed on the person level. On the contrary, the regression analyses with workload and work autonomy as independent variables as well as the interaction effect of personality and contextual variables were performed on the daily level. In order to perform the interaction effect, moderator variables were created by multiplying each personality trait with the corresponding contextual variable. Subsequently, the regression analyses for each hypothesis were performed with these new variables as independent ones. In order to be able to process the data on the daily level, the data were restructured, so each row on SPSS corresponded in one day of the week. Thus, each participant had 5 rows (from the 5 days of the week).

## Results

In this section the results of this study are presented. Following the sequence of the hypotheses, first descriptive statistics of the variables are provided. Subsequently, relational analyses among the variables are being presented and explained. In the end, diagrams that depict the fluctuation of the main variables can be seen.

### Descriptives

In total there were 488 Learning Moments from 45 participants, which denotes that on average 10.5 Learning Moments correspond to each participant.

**Table 3.**

#### *Overview of reported Learning Moments (LMs)*

| Reported Learning Moments |       | Frequencies | Percentage |
|---------------------------|-------|-------------|------------|
| Monday                    | 0LM   | 9           | 20.0%      |
|                           | 1 LM  | 2           | 4.4%       |
|                           | 2 LMs | 5           | 11.1%      |
|                           | 3 LMs | 29          | 64.4%      |
| Tuesday                   | 0 LM  | 6           | 13.3%      |
|                           | 1 LM  | 3           | 6.7%       |
|                           | 2 LMs | 4           | 8.9%       |
|                           | 3 LMs | 32          | 71.1%      |
| Wednesday                 | 0 LM  | 7           | 15.6%      |
|                           | 1 LM  | 7           | 15.6%      |
|                           | 2 LMs | 1           | 2.2%       |

|          |       |    |       |
|----------|-------|----|-------|
|          | 3 LMs | 30 | 6.7%  |
| Thursday | 0 LM  | 10 | 22.2% |
|          | 1 LM  | 6  | 13.3% |
|          | 2 LMs | 1  | 2.2%  |
|          | 3 LMs | 28 | 62.2% |
| Friday   | 0 LM  | 13 | 28.9% |
|          | 1 LM  | 1  | 2.2%  |
|          | 2 LMs | 3  | 6.7%  |
|          | 3 LMs | 28 | 62.2% |

### Forethought Phase

#### Planning

From all 488 reported Learning Moments, 314 of them reflected a learning experience. In the rest 174 Learning Moments (35.7%), participants indicated that they did not learn anything or they did not have time to report their learning.

**Table 4.**

#### *Overview of intention to learn.*

| <b>Intention to learn</b> | <b>Frequencies</b> | <b>Percentage</b> |
|---------------------------|--------------------|-------------------|
| Planned learning          | 114                | 36.3%             |
| Learning wish             | 65                 | 20.7%             |
| Unplanned                 | 135                | 43.0%             |
| Total                     | 314                | 100.0%            |

#### Goal orientation

From the overall 314 Learning Moments in which participants indicated that they learned something, there were 135 unplanned learning experiences. The question that was asked for goal orientation was “what was the most important reason to learn this?”. Mostly this question was given the answer ‘it was necessary to my role in the team’ (39,1%). ‘I wanted to improve something’ (30.2%), and ‘I wanted to develop myself in this’ (20%).

**Table 5.*****Overview of the goal orientation.***

| <b>Goal orientation</b>                              | <b>Frequencies</b> | <b>Percentage</b> |
|------------------------------------------------------|--------------------|-------------------|
| It was necessary to my role in the team              | 70                 | 39.1%             |
| I wanted to improve something                        | 54                 | 30.2%             |
| Out of curiosity                                     | 13                 | 7.3%              |
| I was encouraged by others to develop myself in this | 6                  | 3.4%              |
| I wanted to develop myself in this                   | 36                 | 20%               |
| Total                                                | 137                | 100.0%            |

**Learning activities**

In table 7 the frequencies and percentages of the learning activities that were chosen from the participants. Most of the chose learning activities are ‘looking up information’ (19.7%), ‘experiencing or doing something’ (19.1%), ‘discussing something with other’ (19.1%).

**Table 6.*****Overview of learning activities***

| <b>Learning Activities</b>                      | <b>Frequencies</b> | <b>Percentage</b> |
|-------------------------------------------------|--------------------|-------------------|
| Experiencing or doing something                 | 60                 | 19.1%             |
| Experience or testing something new             | 19                 | 6.1%              |
| Reflecting on an experience                     | 30                 | 9.6%              |
| Looking up information (book, internet, etc)    | 62                 | 19.7%             |
| Observing how others did something              | 22                 | 7.0%              |
| Discussing something with others                | 60                 | 19.1%             |
| Getting feedback from others                    | 22                 | 7.0%              |
| Seeking help or information from others         | 9                  | 2.9%              |
| Participating in a workshop, training or course | 26                 | 8.3%              |
| Other                                           | 4                  | 1.3%              |
| Total                                           | 314                | 100.0%            |

‘Observing how others did something’, ‘discuss something with others’, ‘getting feedback from others’ and ‘seeking help or information from others’ are part of social learning activities. 113 of the activities (36.0%) were reported to be social learning.

#### Quantity of SDL

Concerning the quantity of SDL, from all the 488 answered Learning Moments, 315 (35.5%) of them were a learning experience whereas the rest 173 were not.

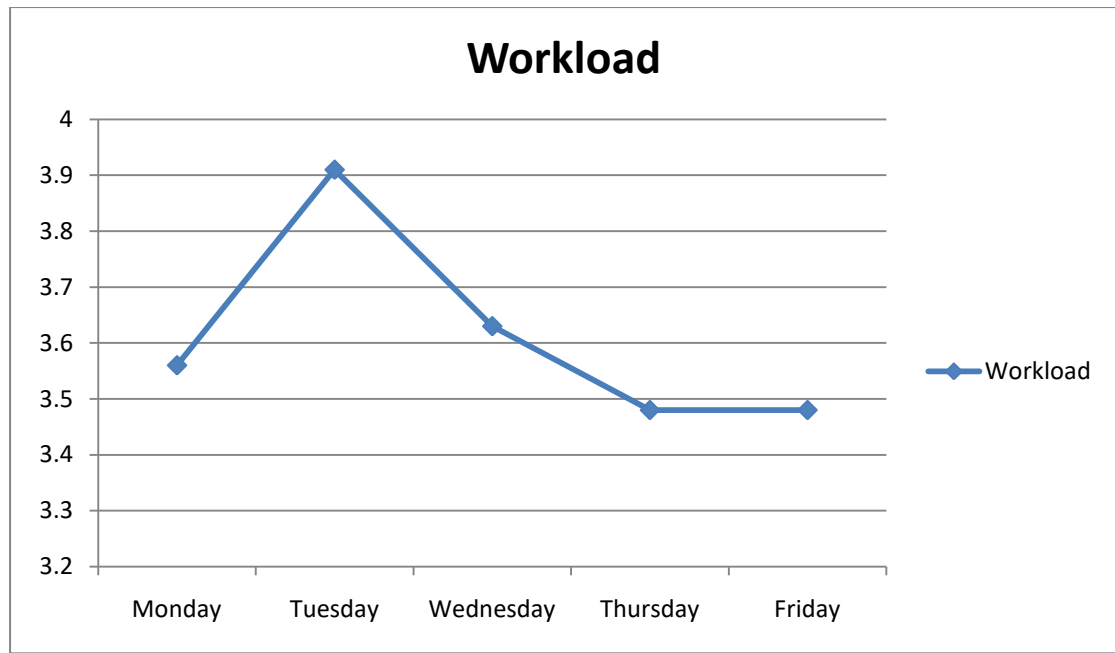
**Table 8.**

#### ***Overview of reported learning***

| <b>Reported learning</b> | <b>Frequencies</b> | <b>Percentage</b> |
|--------------------------|--------------------|-------------------|
| I did not learn anything | 173                | 35.5%             |
| I learned something      | 315                | 64.5%             |
| Total                    | 488                | 100.0%            |

#### Workload

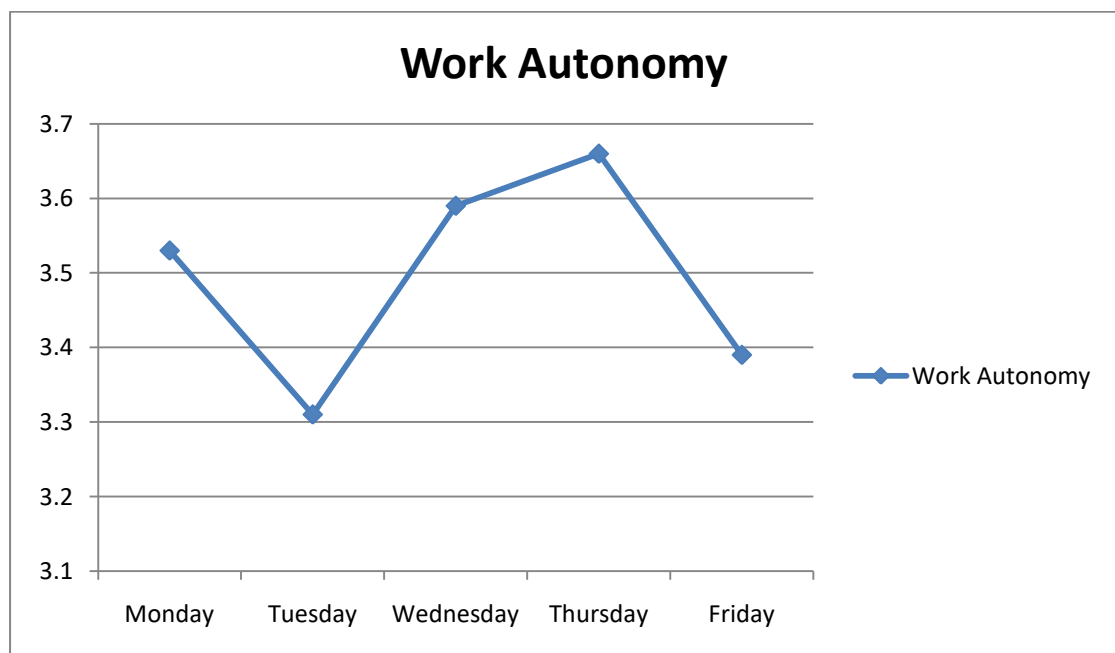
The chart below depicts the fluctuation of workload over days of the week. It seems that Tuesday is the day with the highest levels of workload, and after this there s a gradual decrease. However, the differences among the scores of the days are quite small.



**Figure 5. Fluctuation of workload**

Work autonomy

Comparing the line of workload with the line of work autonomy, it seems that most of the days the fluctuation goes antithetically. Respondents had more work autonomy on Monday comparing to Tuesday. After Tuesday there is a decrease in work autonomy, something that drops again on Friday.



**Figure 6. Fluctuation of work autonomy**

## Relational analyses

In this section, the relational results, according to the research hypotheses are presented. First, the results demonstrate whether employees engaged more in self-directed activities at the beginning of the day and the week rather than at the end of the day and the week. Subsequently, linear regression analyses would indicate whether there is an interaction effect between personality traits and the corresponding contextual variables on the employees' quantity and quality of SDL.

### Employees' quantity and quality of SDL at the beginning and end of the day

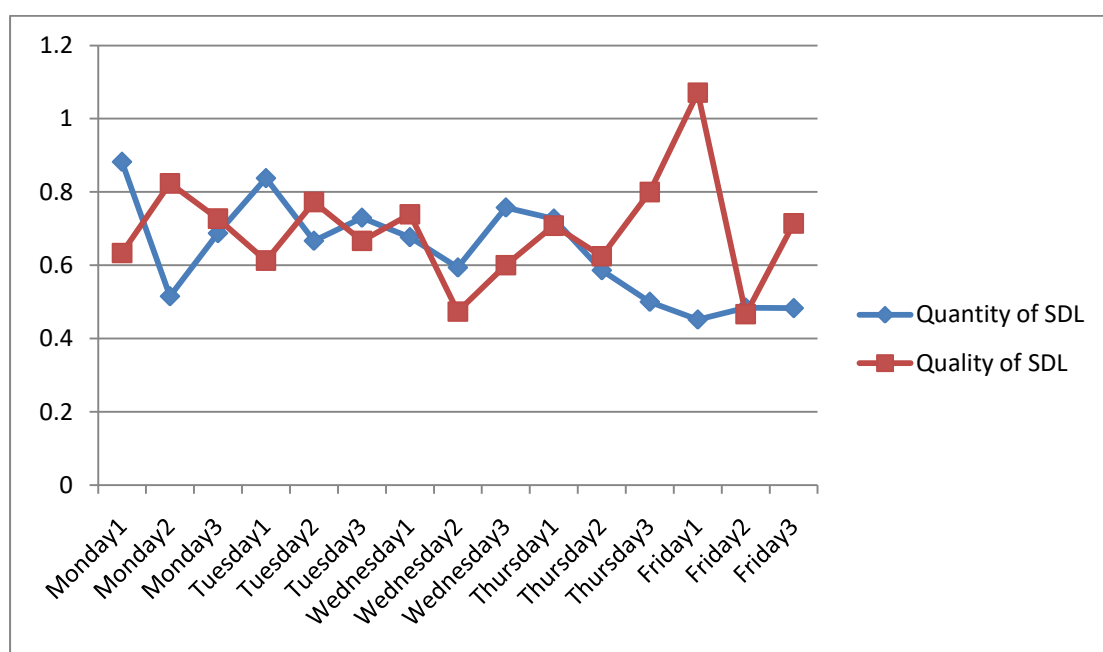
In order to examine the hypothesis that employees engage more in self-directed activities at the beginning of the day rather than in the end of it, each reported learning experience was evaluated as of high SDL (2 points), a bit SDL (1 point), no SDL (0 points). In order to either reject or confirm this hypothesis a one-way ANOVA with post-hoc Bonferroni test was performed in order to compare the mean differences between the three points in time, namely the beginning, middle and end of the day as well as investigate whether the time of the day can influence the employees' quantity and quality of SDL.

Concerning the quantity of SDL as the dependent variable, the analysis of variance showed that the effect of time on the employees' quantity of SDL was not significant,  $F(2,127) = 2.604$ ,  $p = 0.078$ . Additional post-hoc comparison using the Bonferroni correction test indicated that the mean score of respondents' quantity of SDL at the beginning of the day ( $M = 0.69$ ,  $SD = 0.29$ ) was not significantly different than the mean score at the end of it ( $M = 0.63$ ,  $SD = 0.36$ ). The mean score of respondents' quantity of SDL at the beginning of the day ( $M = 0.69$ ,  $SD = 0.29$ ) was not significantly different than the mean score in the middle of it ( $M = 0.51$ ,  $SD = 0.41$ ).

Concerning the quality of SDL as the dependent variable, the analysis of variance showed that the effect of time on the employees' quality of SDL was also not significant,  $F(2,106) = 0.177$ ,  $p = 0.838$ . Additional post-hoc comparison using the Bonferroni correction test indicated that the mean score of respondents' quantity of SDL at the beginning of the day ( $M = 0.63$ ,  $SD = 0.54$ ) was not significantly different than the mean score at the end of it ( $M = 0.66$ ,  $SD = 0.58$ ). The mean score of respondents' quantity of SDL at the beginning of the day ( $M = 0.63$ ,  $SD = 0.54$ ) was

also not significantly different than the mean score in the middle of it ( $M= 0.58$ ,  $SD= 0.53$ ).

Taking all these results into account, it is inferred that employees while working in their workplace do not engage more in self-directed activities at the beginning of the day than at the end of it. However, Figure 7 shows the overview of the fluctuation of both the quantity and quality of SDL in all three points of the day throughout the week. Apart from Wednesday and Friday, the other three days indeed show that employees engage in more SDL activities in the mornings. String is also that in that mostly, when employees have a bigger quantity of SDL the quality is lower and vice versa. The fluctuations of SDL will be explained in more detail in the results section.



**Figure 7. Overview of the fluctuation of the quality and quantity of SDL in the day and week**

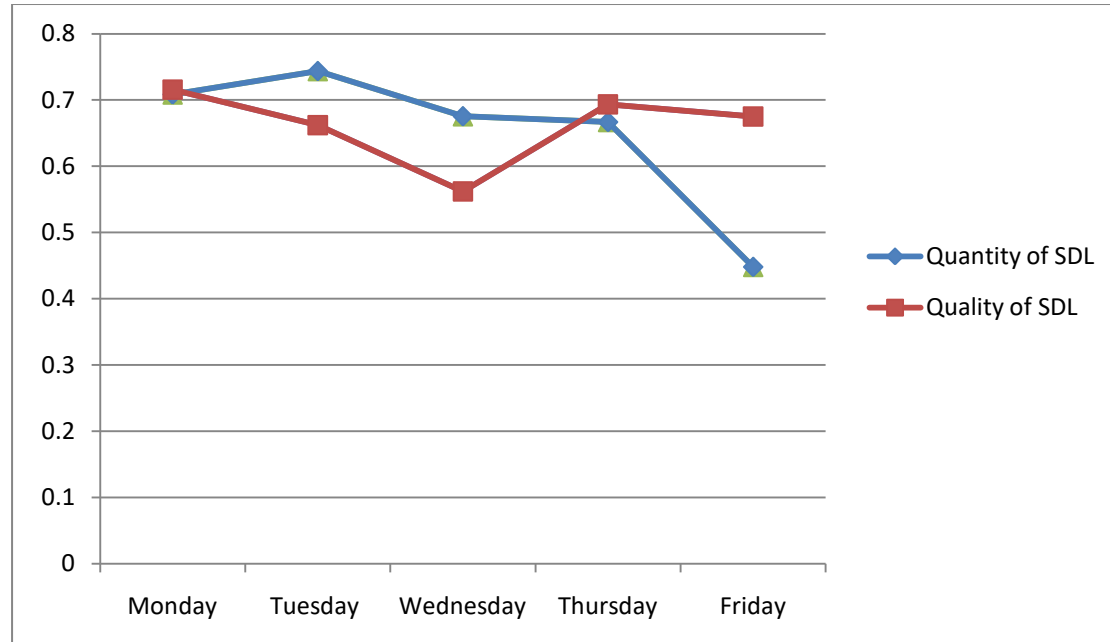
### **Employees' level of SDL at the beginning and end of the week**

For examining the hypothesis that employees engage more in SDL activities at the beginning of the week rather than at the end of it, a paired t-test was conducted. The 'beginning of the week' was considered the average score of the level of SDL of each learning experience of Monday and Tuesday. The 'end of the week' was considered as the level of SDL of each learning experience of Thursday and Friday. The scores of

the level of SDL of each learning experience were calculated the same way as in the previous hypothesis.

A paired samples t-test was conducted in order to compare the quantity of respondents' SDL at the beginning and end of their working week. There was a significant difference in the mean scores for the beginning of the week ( $M= 0.72$ ,  $SD= 0.23$ ) and the end of it ( $M= 0.59$ ,  $SD= 0.39$ );  $t= 2.220$ ,  $p= 0.032$ . More specifically, indeed employees do engage in bigger number of self-directed activities, at the beginning of the week rather than at the end of it.

Another paired samples t-test was conducted in order to compare the quality of respondents' SDL at the beginning and end of their working week. A non significant difference in the mean scores for the beginning of the week ( $M= 0.70$ ,  $SD= 0.45$ ) and the end of it ( $M= 0.70$ ,  $SD= 0.57$ ) were found;  $t= 0.00$ ,  $p= 1$ . Thus, it is proved that employees do not engage more in self-directed activities, at the beginning of the week than at the end of it.



**Figure 8 Fluctuation of quantity and quality of SDL over the week.**

However, it is very striking from the graphical representation of the fluctuation of SDL (Figure 5 and 6) that the quality of SDL reaches maximum the value of 0.7. This means that on average the employees engage only close to a vbit

self-directed activities. On average, the learning activities were mostly varying from not self-directed to a bit self-directed. According to the visual graph, it is also important to mention that it is also here obvious that people engage in more self-directed activities at the beginning of the week. Indeed it is obvious that the quantity of SDL drops significantly especially from Thursday to Friday. Moreover, the mean score of Tuesday is a bit higher than the one of Monday. On the contrary, although the quantity of SDL tends to drop towards the end of the week it is also visually confirmed that the quality of SDL is increasing. Reasons for these outcomes as well as its counterarguments will be discussed further in the discussion section.

### **The interaction effect of personality traits and contextual variables**

For testing following two hypotheses the number of respondents is 46, because only the data from the participants that completed the General Background Questionnaire could be used.

*Conscientiousness and workload on self-directed learning.* In order to examine the interaction effect conscientiousness and workload on employees' quantity and quality of SDL, a new variable was created where the score of their conscientiousness and workload of each day was multiplied. Prior to this, the main effect of conscientiousness on the quality and quantity of SDL was calculated on the person level. Additionally, the main effect of daily levels of workload on the two variables of SDL was calculated on the daily level. In order to examine the interaction effect of conscientiousness and workload on SDL another linear regression was conducted on the daily level.

Data analyses were performed with both ways of measuring SDL as dependent variable. Concerning the quantity of SDL as the outcome variable, a simple linear regression was calculated to predict the quantity of SDL activities that the respondents engaged in, based on their score on the personality trait of conscientiousness. A non significant regression equation was found ( $F(1,40) = 0.25$ ,  $p = 0.874$ ) with an  $R^2$  of 0.025. Thus only the 2,4 % of the variance of the quantity of SDL is explained by the model (Table 9). Subsequently, another simple linear regression was calculated to predict the quantity of SDL activities that the respondents engaged in, based on their daily level of workload. A non significant regression equation was found ( $F(1,149) = 1.703$ ,  $p = 0.194$ ) with an  $R^2$  of 0.106. Thus only the 10,6 % of the variance of the

quantity of SDL is explained by the model (Table 10). Regarding the interaction of the two independent variables on the quantity of SDL, a non significant regression was found ( $F(1,144)= 0.803$ ,  $p= 0.372$ ), with an  $R^2$  of 0.006. Thus, only the 0.6% of the variance of the quantity of SDL is explained by the model (Table 11). Overall, conscientiousness and workload do not have a main effect on the quantity of SDL. Additionally, the interaction of the two independent variables does not also have an effect on the outcome one.

**Table 9**

***Regression Analysis of Quantity of SDL in Relation to Conscientiousness***

| Variables in relation to the<br>Quantity of SDL | Unstandardised<br>Coefficients |      | $\beta$ | t      | Sig. |
|-------------------------------------------------|--------------------------------|------|---------|--------|------|
|                                                 | B                              | SE   |         |        |      |
| Conscientiousness                               | -.014                          | .088 | -.025   | -.0159 | .874 |

**Table 10**

***Regression Analysis of Quantity of SDL in Relation to Workload***

| Variables in relation to the<br>Quantity of SDL | Unstandardised<br>Coefficients |      | $\beta$ | t     | Sig. |
|-------------------------------------------------|--------------------------------|------|---------|-------|------|
|                                                 | B                              | SE   |         |       |      |
| Workload                                        | .034                           | .026 | .106    | 1.305 | .194 |

**Table 7*****Regression Analysis of Quantity of SDL in Relation to Conscientiousness \*  
Workload***

| Variables in relation to the<br>Quantity of SDL | Unstandardised<br>Coefficients |    | $\beta$ | t | Sig. |
|-------------------------------------------------|--------------------------------|----|---------|---|------|
|                                                 | B                              | SE |         |   |      |

|                   | B     | SE   |       |        |      |
|-------------------|-------|------|-------|--------|------|
| Conscientiousness | -.014 | .088 | -.025 | -.0159 | .874 |
| * Workload        |       |      |       |        |      |

Concerning the quality of SDL as the dependent variable, a simple linear regression was calculated to predict the employees' quality of SDL activities, based on their score on the personality trait of conscientiousness. A non significant regression equation was found ( $F(1,40)= 0.189$ ,  $p= 0.666$ ) with an  $R^2$  of 0.069. Thus only the 6,9 % of the variance of the quality of SDL is explained by the model (Table 12). Subsequently, another simple linear regression was calculated to predict the quality of SDL activities that the respondents engaged in, based on their daily level of workload. A non significant regression equation was found ( $F(1,130)= 0.033$ ,  $p= 0.855$ ) with an  $R^2$  of 0.016. Thus, only the 1,6 % of the variance of the quantity of SDL is explained by the model. Regarding the interaction of the two independent variables on the quality of SDL, a non significant regression was found ( $F(1,128)= 0.040$ ,  $p= 0.841$ ), with an  $R^2$  of 0.018. Thus, only the 1,8% of the variance of the quantity of SDL is explained by the model. Overall, conscientiousness and workload do not have a main effect on the quality of SDL. Additionally, the interaction of the two independent variables does not also have an effect on the outcome one. Hence, the hypothesis that employees that score high on conscientiousness and have low levels of daily workload engage more in SDL activities was not confirmed.

**Table 12**

***Regression Analysis of the Quality of SDL in Relation to Conscientiousness***

| Variables in relation to the<br>Quality of SDL | Unstandardised<br>Coefficients |      | $\beta$ | t     | Sig. |
|------------------------------------------------|--------------------------------|------|---------|-------|------|
|                                                | B                              | SE   |         |       |      |
| Conscientiousness                              | -.061                          | .141 | -.069   | -.435 | .666 |

**Table 13**

***Regression Analysis of the Quality of SDL in Relation to Workload***

| Variables in relation to the<br>Quality of SDL | Unstandardised<br>Coefficients |      | $\beta$ | t    | Sig. |
|------------------------------------------------|--------------------------------|------|---------|------|------|
|                                                | B                              | SE   |         |      |      |
| Workload                                       | .009                           | .047 | .016    | .183 | .855 |

**Table 14**

***Regression Analysis of the Quality of SDL in Relation to Conscientiousness \*  
Workload***

| Variables in relation to the<br>Quality of SDL | Unstandardised<br>Coefficients |      | $\beta$ | t     | Sig. |
|------------------------------------------------|--------------------------------|------|---------|-------|------|
|                                                | B                              | SE   |         |       |      |
| Conscientiousness                              | -.002                          | .011 | -.018   | -.201 | .841 |
| * Workload                                     |                                |      |         |       |      |

*Openness to experience and work autonomy on self-directed learning.* In order to examine the interaction effect of openness to experience and work autonomy on employees' quantity and quality of SDL, a new variable was created where the score of their openness to experience and work autonomy of each day was multiplied. Prior to this, the main effect of openness to experience on the quality and quantity of SDL was calculated on the person level. Additionally, the main effect of daily levels of work autonomy on the two variables of SDL was calculated on the daily level. In order to examine the interaction effect of openness to experience and work autonomy on SDL another linear regression was conducted on the daily level.

Data analyses were performed with both ways of measuring SDL as dependent variable. Concerning the quantity of SDL as the outcome variable, a simple linear regression was calculated to predict the quantity of SDL activities that the respondents engaged in, based on their score on the personality trait of openness to experience. A significant regression equation was found ( $F(1,40)= 10.655$ ,  $p= 0.002$ ) with an  $R^2$  of

0.459. Thus, the 45,9 % of the variance of the quality of SDL is explained by the model (Table 15). Subsequently, another simple linear regression was calculated to predict the quantity of SDL activities that the respondents engaged in, based on their daily level of work autonomy. A non significant regression equation was found ( $F(1,149)= 0.005$ ,  $p= 0.944$ ) with an  $R^2$  of 0.006. Thus only the 0,6 % of the variance of the quantity of SDL is explained by the model (Table 16). Regarding the interaction of the two independent variables on the quantity of SDL, a non significant regression was found ( $F(1,144)= 1.430$ ,  $p= 0.234$ ), with an  $R^2$  of 0.99. Thus, only the 9.9% of the variance of the quantity of SDL is explained by the model (Table 17). Overall, only openness to experience does have a main effect on the quantity of SDL, whereas work autonomy does not. Additionally, the interaction of the two independent variables does not also have an effect on the outcome one.

**Table 15**

***Regression Analysis of Quantity of SDL in Relation to Openness to Experience***

| Variables in relation to the<br>Quantity of SDL | Unstandardised<br>Coefficients |      | $\beta$ | t     | Sig. |
|-------------------------------------------------|--------------------------------|------|---------|-------|------|
|                                                 | B                              | SE   |         |       |      |
| Openness to<br>Experience                       | .226                           | .069 | .459    | 3.264 | .002 |

**Table 16**

***Regression Analysis of Quantity of SDL in Relation to Work Autonomy***

| Variables in relation to the<br>Quantity of SDL | Unstandardised<br>Coefficients |      | $\beta$ | t     | Sig. |
|-------------------------------------------------|--------------------------------|------|---------|-------|------|
|                                                 | B                              | SE   |         |       |      |
| Work Autonomy                                   | -.002                          | .025 | -.006   | -.070 | .944 |

**Table 17*****Regression Analysis of Quantity of SDL in Relation to Openness to Experience \*  
Work Autonomy***

| Variables in relation to the<br>Quantity of SDL | Unstandardised<br>Coefficients |      | $\beta$ | t     | Sig. |
|-------------------------------------------------|--------------------------------|------|---------|-------|------|
|                                                 | B                              | SE   |         |       |      |
| Openness to<br>Experience *<br>Work Autonomy    | .007                           | .006 | .099    | 1.196 | .234 |

Concerning the quality of SDL as the dependent variable, a simple linear regression was calculated to predict the employees' quality of SDL activities, based on their score on the personality trait of openness to experience. A non significant regression equation was found ( $F(1,40)= 0.312$ ,  $p= 0.579$ ) with an  $R^2$  of 0.088. Thus only the 8,8% of the variance of the quality of SDL is explained by the model (Table 18). Subsequently, another simple linear regression was calculated to predict the quality of SDL activities that the respondents engaged in, based on their daily level of work autonomy. A non significant regression equation was found ( $F(1,130)= 0.469$ ,  $p= 0.495$ ) with an  $R^2$  of 0.060. Thus, only the 6% of the variance of the quality of SDL is explained by the model. Regarding the interaction of the two independent variables on the quality of SDL, a non significant regression was found ( $F(1,128)= 0.591$ ,  $p= 0.443$ , with an  $R^2$  of 0.068. Thus, only the 6,8% of the variance of the quality of SDL is explained by the model. Overall, openness to experience and work autonomy do not have a main effect on the quality of SDL. Additionally, the interaction of the two independent variables does not also have an effect on the outcome one. Hence, the hypothesis that employees that score high on openness to experience and have high level of daily work autonomy engage more in SDL activities was not confirmed.

**Table 18*****Regression Analysis of the Quality of SDL in Relation to Openness to Experience***

| Variables in relation to the Quality of SDL | Unstandardised Coefficients |      | $\beta$ | t    | Sig. |
|---------------------------------------------|-----------------------------|------|---------|------|------|
|                                             | B                           | SE   |         |      |      |
| Openness to Experience                      | .070                        | .125 | .088    | .559 | .579 |

**Table 19**

***Regression Analysis of the Quality of SDL in Relation to Work Autonomy***

| Variables in relation to the Quality of SDL | Unstandardised Coefficients |      | $\beta$ | t    | Sig. |
|---------------------------------------------|-----------------------------|------|---------|------|------|
|                                             | B                           | SE   |         |      |      |
| Work Autonomy                               | ..029                       | .042 | .060    | .685 | .495 |

**Table 20**

***Regression Analysis of the Quality of SDL in Relation to Openness to Experience \* Work Autonomy***

| Variables in relation to the Quality of SDL | Unstandardised Coefficients |      | $\beta$ | t    | Sig. |
|---------------------------------------------|-----------------------------|------|---------|------|------|
|                                             | B                           | SE   |         |      |      |
| Openness to Experience *                    | .008                        | .010 | .068    | .769 | .443 |
| Work Autonomy                               |                             |      |         |      |      |

## Discussion and Conclusions

The purpose of this research was to examine employees' self-directed learning fluctuation by measuring it through a multi-event measurement tool. More specifically, the interaction effect between personality traits and contextual variables on employees' SDL, as well as its fluctuation in the day and the week were investigated. 488 Learning Moments 159 Workday Overview questionnaires were analysed. In this section the results of the current research will be discussed as well as limitations and practical implications will be provided.

The first hypothesis regards the issue of engaging more in SDL activities at the beginning of the day rather than at the end of it. This hypothesis was not confirmed. It seems that there is no fluctuation of employees' SDL over the day. Therefore, it seems that individuals exploit and take advantage of learning opportunities and resources mostly at the beginning of the day. However, there might be another reason that supports these results. In fact, it can be possible that the context does not allow the participants to learn towards the end of the day, as colleagues are not available anymore for interaction, or personal fatigue leads the employees to avoid learning opportunities. The hypothesis that employees engage more in SDL activities at the beginning of the week rather than at the end of it was confirmed only quantitatively. This means that employees tend to engage more frequently in learning activities at the beginning of the week rather than at the end of it. This is in line with the fact that employees need more time and effort in order to plan their learning as well as to allocate opportunities to learn. According to Lohman (2000) lack of time and access to learning resources are significant inhibitors for workplace learning. Thus, it is logical that at the beginning of the week these requirements can be met. Additionally, physical and mental fatigue can explain why employees do not have the cognitive space to learn more at the end of the week. This also explains why in the fluctuation diagrams it is obvious that at the end of the week participants engaged in less learning experiences but of higher quality. In other words, focusing in less learning experiences enabled them to put more time and effort in planning their learning not only because it is required externally but because it is their own intention.

Additionally, it was hypothesised that employees that score high in conscientiousness and have low levels of workload would engage more in SDL activities. This hypothesis was not confirmed either quantitatively or qualitatively.

The studies of Kemper (2004), and Karasek and Theorell (1990) which found that high levels of workload hinder learning contradict with the results of this study. The reason behind that can lie on the results of van Ruysseveldt and van Dijke (2011) who found that the relationship of workload and engagement in learning opportunities is not linear rather it follows an inverted curvilinear model. More specifically, it was argued, that when workload is relatively low increases in levels of workload can enhance engagement in learning opportunities (van Ruysseveldt & van Dijke, 2011). Whereas when workload is fairly high, further increase of it can hinder workplace learning (van Ruysseveldt & van Dijke, 2011). Based on the fluctuation of workload levels over the week, perceived workload was everyday a bit above average, with a decrease after Tuesday. This tendency resembles a lot the line of the quantity of SDL, indicating that when employees had more time at their work, they did not engage in learning experience, proving the hypothesis again wrong. However, towards the end of the week when their workload levels were lower, employees engaged learning experiences of higher quality. This is in line with Kemper (2004) who argues that high workload results in surface learning. Additionally, although conscientiousness was argued to be an indication of motivation to learn (Colquitt et al., 2000), we did not find a link between conscientiousness and SDL.

The hypothesis that scoring high on openness to experience and when the daily levels of work autonomy are also high, result in higher engagement in SDL activities was partly confirmed. More specifically, it was found that only openness to experience influences the quantity of learning experiences employees engage in. This is in line with Pace and Brannick (2010) who argue that individuals that are open to new experiences, are able to connect past experiences with newly acquired knowledge as well as adapt easily in changing environments. Although work autonomy can promote individuals to utilise available learning opportunities (van Ruysseveldt & van Dijke, 2011) the results of this study did not confirm this view.

### **Limitations and Recommendations for Further Research**

In spite the fact that several disadvantages and potential problems tried to be controlled, this study has some limitations. First of all, it should be noted that in order to participate in this study and report daily three learning experiences, a certain amount of cognitive abilities and reflection skills was required. According to Ellinger

(2004), a considerable amount of workplace learning is unplanned, which denotes that it can be unconscious. Therefore, it is probable that for measuring the quantity of SDL in the workplace, employees may not be even aware that they engaged in a learning activity and thus did not report it. Additionally, although this research did not aim to examine employees' perceptions on SDL rather their actual behaviours, data collection was still a form of self-report. In that sense, some degree of social desirability bias cannot be avoided. In fact, when filling in self-reports, people tend to present the best version of themselves, which is not representative of the reality and mislead the results (Fisher, 1993). A way to overcome this issue would be to include in further research the elements of observation from subject-matter experts.

Another limitation of this study was that when measuring the quality of SDL, only the forethought phase is addressed. More specifically, the model for SDL from Pintrich (2000) and Zimmerman (2000) includes also the phases of performance and self-reflection. Thus, the current research measured only the extent to which planning and goal orientation are influenced by individual and contextual factors. Additionally, considering the measurement of the contextual factors, few improvements could be made. The question that was deployed for measuring work autonomy was adapted from Raemdonck et al. (2012), and initially constructed to measure this variable as a stable contextual characteristic, not as a fluctuating one. Hence, it is probable that the construct validity, namely the degree to which the way the construct of work autonomy was operationalised, indeed reflects the concept (Bagozzi, Yi, & Phillips, 1991), could have been violated. The same may apply also for the variable of workload, which was measured with a self-created question. Scales that measure these constructs on the daily level need to be constructed and used in further research.

The current research managed to collect data only from a small amount of participants. This could also be a reason for the lack of significant results. Thus, repeating the research with more participants could increase the probability of confirming the hypotheses. Additionally, a bigger sample would enhance the generalisability of the results. Another limitation of this research could be the sampling method. The snowball sampling method was chosen in order to reach as many participants as possible as well as respondents from a variety of contexts and representative demographics. However, population representation cannot be ensured. More specifically, there is the risk of overrepresentation of respondents with similar

demographics (Sadler, Lim, Lee, & Fullerton, 2010). Indeed, there was high representation of respondents working in Greece and the Netherlands as well as of employees working in the sectors of public services, administration, teacher training and education. Future research with a more random sample could yield results with higher external reliability.

Concerning data collection and user-friendliness, two adaptations could have been made. First, the whole research and data collection was conducted in English. From all the participants, only 13% of them were native in English. This language barrier may have caused some difficulties to the participants. Second, data was collected through questionnaires sent to the participants via email. Using a more easily accessible way of answering the questions, such as a mobile application, may have been easier and have yielded a higher response rate or even more participants. However, it should also be mentioned that a number of participants also expressed their discomfort and annoyance by the amount of time and energy required to participate in the study. Moreover, it was expressed by the participants that sometimes it was hard to find so many learning experiences to report each day. Therefore, a suggestion for further research could be to decrease the number of learning experiences per day and/or increase the period of data collection. By increasing the data collection period, more reported learning experiences could be expected to be gathered. However, there can also be the risk of higher levels of participant mortality.

This study aimed to measure both the quality and the quantity of self-directed learning in the workplace in various settings and contexts. Further improvements can be made mainly for the quality of the level of employees' SDL. As the current research measured only the forethought phase of SDL, future research can add more questions in order to include the next two phases, namely the performance and self-reflection phase. The Structured Learning Report (Endedijk et al., 2015), a multiple-event instrument that captures the regulation of learning independently of context, entails questions that address all three phases of SDL and could be used in a similar research.

The second hypothesis justified that employees engage both in more learning experiences at the beginning of the week than at the end of it. However, in order to ensure the significance of this result, further research could be conducted with the

starting point of data collection on a Thursday and end on a Wednesday. In case of concluding with the same results, the possible assumption that the results of the current study were found due to the respondents' drop out will be rejected.

## **Practical Implications and Conclusion**

After completion of the data collection, there were several participants that expressed their interest and positive feedback about this quite unconventional way of data collection. Although they were not asked to provide feedback, some of them took the opportunity to reach back and demonstrate that despite the high amount of time and effort allocation needed, it was a very interesting and entertaining procedure. Additionally, there were comments from participants that indicated that their participation helped them be more aware for their learning during their work, as well as about the opportunities that there are available. Therefore, a practical implication for HRD practitioners could be to enhance more opportunities for reflection. Indeed, as a strategy choice, learning by reflecting on a past experience was proved to be not so often chosen from the participants, which means that reflection is a point that requires more attention in the workplace.

As some participants indicated that it was hard for them to report three learning activities per day, it can be inferred that there are very few learning opportunities in the workplace that people can engage in. Therefore, organisations should increase the learning opportunities as well as promote a learning culture.

In conclusion, although self-directed learning has undeniable advantages for organisations and employees themselves, its implementation and enhancement is still a challenge. Although not confirmed in this study, HRD professionals should carefully consider both personality traits of the individuals as well as contextual elements when creating learning opportunities for employees. Detail needs assessment and evaluation of the work context should be conducted and taken into consideration, when aiming to enhance employees' self directed learning.

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## Appendix A

### General Background Questionnaire

#### Introduction

Great, that you made it to the page of our study. So, what can you expect, when you decide to participate?

#### 1. Fill in a general background questionnaire (15-20 minutes)

This questionnaire enables us to better understand your personal background, which is of major importance to interpret the findings of the study. The questionnaire contains some general background questions, questions about your work context and statements about your personal characteristics. To participate in the study, it is necessary to complete the questionnaire before Monday 29th of May, 2017.

#### 2. Fill in your daily Learning Moments (3x3 minutes per day)

Monday through Friday, you will be sent an email three times per day (11.00 am, 1.30 pm, and 4.30 pm) to remind you to register your Learning Moments of that day. But, what are Learning Moments? Quite a lot of different situations can form a learning moment. Looking something up on the internet, having a chat with colleagues or experimenting with a new working procedure can all be considered as Learning Moments. No time to register your learning moment or you did not learn anything that day? No problem, it will only cost you three seconds to let us know. But do not ignore your emails. It is also valuable for us to take three seconds to indicate that you did not learn anything or that you do not have time. You will receive the first questionnaire about your learning moment via email on Monday, May 29th 2017 at 11:00 A.M. and the last on Friday, June 2nd, 2017 at 5:15 P.M., so you will be done before the weekend, which is great.

#### 3. Workday Overview Questions (1 minute per day)

We all know that every day at work does not look like the previous ones. Therefore, we ask you to rate each working day by answering to 8 questions that give an idea of how your day was. You will receive this short questionnaire at the end of the day (5.15 pm). This questionnaire is of high importance for us, so please take one minute to fill it in even if you did not complete the Learning Moments of that day. This is doable, right? So, let us not waste time and click on “>>” button to start with the first part of the study.

PS: If you have any further questions regarding the study, if you need technical assistance or otherwise help, please contact one of the researchers.

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### **Informed Consent**

The purpose of this study is to get insight in the relation between personality and workplace learning and self-directed learning, and which other factor influence this relation. The data gathered from the personality questionnaire will be related with the learning behavior. This is done as part of the Bachelor thesis of Max Klemm and the Master thesis of Alexandra Petli with the department of Psychology and the department of Educational Science at the University of Twente.

‘I hereby declare that I have been informed in a manner which is clear to me about the nature and method of the research as described in the aforementioned information brochure on the page before. My questions have been answered to my satisfaction. I agree of my own free will to participate in this research. I reserve the right to withdraw this consent without the need to give any reason and I am aware that I may withdraw from the experiment at any time. If my research results are to be used in scientific publications or made public in any other manner, then they will be made completely anonymous. My personal data will not be disclosed to third parties without my express permission. If I request further information about the research, now or in the future, I may contact:

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By continuing to the next page, I agree on the terms and conditions written on this page and the page before.

### **Demographics**

Here we would like to get some information about your background.

What is your age? (If you do not wish to give this information, leave this question blank)

I am a ...

- Man
- Woman

- Other/I don't want to give this information

What is the highest level of education completed?

- Primary School
- High School (e.g. HAVO/ VWO/ Abitur)
- Vocational Education
- Bachelor
- Master
- PhD

In which country do you work?

- Netherlands
- Germany
- Other, namely...

In which sector are you working?

- Accountancy, Banking and Finance
- Business, Consulting and Management
- Energy and Utilities
- Engineering and Manufacturing
- Environment and Agriculture
- Healthcare
- Hospitality and Events management
- Information Technology
- Law
- Law enforcement and Security
- Leisure, Sport and Tourism
- Marketing Advertising and PR
- Media and Internet

- Public Services and Administration
- Recruitment and HR
- Research Institutes
- Retail
- Sales
- Teacher training and Education
- Transport and Logistics

What would best describe your current work situation?

- I work on secondment (in Dutch: gedetacheerd)
- I am an entrepreneur
- I am a freelance worker
- I am obtaining a doctoral degree
- I work as a temporary / standby employee

What is the name of your current function?

Colleagues are the people you work together with in a team/ office/ department.

Taking this definition of 'colleagues' into account, how many colleagues do you have?

According to your contract, how many hours do you work per week?

On which days of the upcoming week (from May 29th to June 2nd) do you plan to work?

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday

## Personality characteristics

We would like to know which personal characteristics suit you best. Please indicate to what extent the bellow statements fit you. There are no right or wrong answers, so please be as honest as possible. Please read each statement and decide how much you agree or disagree with that statement. 5 = strongly agree, 4 = agree, 3 = neutral (neither agree nor disagree), 2 = disagree, 1 = strongly disagree

1. I would be quite bored by a visit to an art gallery.
2. I clean my office or home quite frequently.
3. I rarely hold a grudge, even against people who have badly wronged me.
4. I feel reasonably satisfied with myself overall.
5. I would feel afraid if I had to travel in bad weather conditions.
6. If I want something from a person I dislike, I will act very nicely toward that person in order to get it.
7. I'm interested in learning about the history and politics of other countries.
8. When working, I often set ambitious goals for myself.
9. People sometimes tell me that I am too critical of others.
10. I rarely express my opinions in group meetings.
11. I sometimes can't help worrying about little things.
12. If I knew that I could never get caught, I would be willing to steal a million dollars.
13. I would like a job that requires following a routine rather than being creative.
14. I often check my work over repeatedly to find any mistakes.
15. People sometimes tell me that I'm too stubborn.
16. I avoid making "small talk" with people.
17. When I suffer from a painful experience, I need someone to make me feel comfortable.
18. Having a lot of money is not especially important to me.

19. I think that paying attention to radical ideas is a waste of time.
20. I make decisions based on the feeling of the moment rather than on careful thought.
21. People think of me as someone who has a quick temper.
22. I am energetic nearly all the time.
23. I feel like crying when I see other people crying.
24. I am an ordinary person who is no better than others.
25. I wouldn't spend my time reading a book of poetry.
26. I plan ahead and organize things, to avoid scrambling at the last minute.
27. My attitude toward people who have treated me badly is "forgive and forget".
28. I think that most people like some aspects of my personality.
29. I don't mind doing jobs that involve dangerous work.
30. I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed.
31. I enjoy looking at maps of different places.
32. I often push myself very hard when trying to achieve a goal.
33. I generally accept people's faults without complaining about them.
34. In social situations, I'm usually the one who makes the first move.
35. I worry a lot less than most people do.
36. I would be tempted to buy stolen property if I were financially tight.
37. I would enjoy creating a work of art, such as a novel, a song, or a painting.
38. When working on something, I don't pay much attention to small details.
39. I am usually quite flexible in my opinions when people disagree with me.
40. I enjoy having lots of people around to talk with.
41. I can handle difficult situations without needing emotional support from anyone else.
42. I would like to live in a very expensive, high-class neighborhood.
43. I like people who have unconventional views.

44. I make a lot of mistakes because I don't think before I act.
45. I rarely feel anger, even when people treat me quite badly.
46. On most days, I feel cheerful and optimistic.
47. When someone I know well is unhappy, I can almost feel that person's pain myself.
48. I wouldn't want people to treat me as though I were superior to them.
49. If I had the opportunity, I would like to attend a classical music concert.
50. People often joke with me about the messiness of my room or desk.
51. If someone has cheated me once, I will always feel suspicious of that person.
52. I feel that I am an unpopular person.
53. When it comes to physical danger, I am very fearful.
54. If I want something from someone, I will laugh at that person's worst jokes.
55. I would be very bored by a book about the history of science and technology.
56. Often when I set a goal, I end up quitting without having reached it.
57. I tend to be lenient in judging other people.
58. When I'm in a group of people, I'm often the one who speaks on behalf of the group.
59. I rarely, if ever, have trouble sleeping due to stress or anxiety.
60. I would never accept a bribe, even if it were very large
61. People have often told me that I have a good imagination.
62. I always try to be accurate in my work, even at the expense of time.
63. When people tell me that I'm wrong, my first reaction is to argue with them.
64. I prefer jobs that involve active social interaction to those that involve working alone.
65. Whenever I feel worried about something, I want to share my concern with another person.
66. I would like to be seen driving around in a very expensive car.
67. I think of myself as a somewhat eccentric person.

68. I don't allow my impulses to govern my behavior.
69. Most people tend to get angry more quickly than I do.
70. People often tell me that I should try to cheer up.
71. I feel strong emotions when someone close to me is going away for a long time.
72. I think that I am entitled to more respect than the average person is.
73. Sometimes I like to just watch the wind as it blows through the trees.
74. When working, I sometimes have difficulties due to being disorganized.
75. I find it hard to fully forgive someone who has done something mean to me.
76. I sometimes feel that I am a worthless person.
77. Even in an emergency I wouldn't feel like panicking.
78. I wouldn't pretend to like someone just to get that person to do favors for me.
79. I've never really enjoyed looking through an encyclopedia.
80. I do only the minimum amount of work needed to get by.
81. Even when people make a lot of mistakes, I rarely say anything negative.
82. I tend to feel quite self conscious when speaking in front of a group of people.
83. I get very anxious when waiting to hear about an important decision.
84. I'd be tempted to use counterfeit money, if I were sure I could get away with it.
85. I don't think of myself as the artistic or creative type.
86. People often call me a perfectionist.
87. I find it hard to compromise with people when I really think I'm right.
88. The first thing that I always do in a new place is to make friends.
89. I rarely discuss my problems with other people.
90. I would get a lot of pleasure from owning expensive luxury goods.
91. I find it boring to discuss philosophy.
92. I prefer to do whatever comes to mind, rather than stick to a plan.
93. I find it hard to keep my temper when people insult me.
94. Most people are more upbeat and dynamic than I generally am.

95. I remain unemotional even in situations where most people get very sentimental.
96. I want people to know that I am an important person of high status.
97. I have sympathy for people who are less fortunate than I am.
98. I try to give generously to those in need.
99. It wouldn't bother me to harm someone I didn't like.
100. People see me as a hardhearted person.

### **Further Instructions**

Thank you for completing this questionnaire! We appreciate your contribution a lot!

But, as we said above, this was the first part of this study. In order to continue with the second step you only have to wait for our email. You will receive the first email on Monday 15th of May, 2017 at 11.00 am. In each email that you will receive, a link to the questionnaire will be provided. You just need to click the link and you will automatically be transferred to the questionnaire page. Apparently, we would like to ask you here for your email. It will only be used in order to be able to send you the next questionnaires as well as link your responses from all the questionnaires. Therefore, it is very important to provide us with an email account that you have regular access to. Your personal information will not be revealed in any case.

Your email address is:

Additionally, we would like to ask you for your first name. Do not worry; it will only be used for giving to the questionnaires a more personal touch. If you do not want to give this information, a fake name also works for us.

Your name is:

## Appendix B

### Learning Moments Questionnaire

|    | Questions                                                | Link to: |
|----|----------------------------------------------------------|----------|
| Q1 | Hi [user-firstname], did you learn anything today?       |          |
|    | Yes                                                      | Q4       |
|    | I'm not sure, give me a hint                             | Q2       |
|    | No                                                       | Q3       |
| Q2 | Maybe you...      *suggestions for learning experiences* |          |
|    | I know now                                               | Q4       |
|    | Still nothing                                            | Q3       |
| Q3 | Please come back later      *explanation closing app*    |          |
|    | <i>Proceed</i>                                           |          |
| Q4 | What have you learned during this experience?            | Q5       |
|    | <i>Respondent input</i>                                  |          |
| Q5 | Thanks! Could you tell something more about that?        | Q6       |
|    | The next questions will walk you through                 |          |
|    | <i>Proceed</i>                                           |          |
| Q6 | Choose the main activity through which you learned.      |          |
|    | I learned by...                                          |          |
|    | experiencing or doing something                          | Q8       |
|    | experimenting or testing something new                   | Q8       |
|    | reflecting on an experience                              | Q8       |
|    | looking up information (book, internet, etc)             | Q8       |
|    | observing how others did something                       | Q7       |

|     |                                                                |     |
|-----|----------------------------------------------------------------|-----|
|     | discussing something with others                               | Q7  |
|     | getting feedback from others                                   | Q7  |
|     | seeking help or information from others                        | Q7  |
|     | participating in a workshop, training or course                | Q8  |
|     | other                                                          | Q8  |
| Q7  | What other people were involved in this activity?              | Q8  |
|     | A colleague from my own team                                   |     |
|     | A colleague or expert from outside of the organization         |     |
|     | A colleague from a different team from inside the organization |     |
|     | A colleague or expert from outside of the organization         |     |
|     | My superior                                                    |     |
|     | A customer, client or user of my product or service            |     |
|     | Support personnel                                              |     |
| Q8  | Did you intend or plan to learn this?                          |     |
|     | Yes, I planned to learn this                                   | Q9  |
|     | Not specifically for this moment, but I had an intention...    | Q9  |
|     | No, it just happened to me                                     | Q10 |
| Q9  | What was the most important reason to learn this?              |     |
|     | It was necessary to my role in the team                        |     |
|     | I wanted to improve something                                  |     |
|     | Out of curiosity                                               |     |
|     | I was encouraged by others to develop myself in this           |     |
|     | I wanted to develop myself in this                             |     |
| Q10 | Thank you for learning today!                                  |     |

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## Appendix C

### Workday Overview Questionnaire

Hello (*participant's first name*) !

How was your day today?

Please answer the following 3 questions in order to rate your day. There are no right or wrong answers. Therefore, we want you to be as honest as possible. We remind you again that your answers will be analysed anonymously and will not be revealed to third parties.

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#### Questions

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Q1 Today, my workload was high.

Totally agree

Agree

Neutral

Disagree

Totally disagree

Q2 Today, my job allowed me...

...to fully work on my own

...to mostly work on my own

...to work on my own as much as I work with other people

...to mostly work with other people

...to fully work with other people

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