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A micro-level within-subject study to investigate the relation between personality, learning at work and the influence of trait activation.
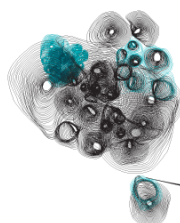
Klemm, M.

1st Supervisor: de Vries, R. E., Prof. Dr.

2nd Supervisor: Endedijk, M., Dr.

Faculty of Behavioural, Management and Social Sciences,

University of Twente

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Abstract

Self-sufficient learning and development of employees at work becomes more and more important for organizations in order to keep up with the fast changing markets of the 21st century. Scientific literature states that a Proactive Personality, comprised of Conscientiousness, Extraversion, and Openness to Experience; may be related to Self-Directed Learning, Social Learning, and Knowledge Creation at work. Additionally, this relation may be stronger when the personality is activated by trait relevant cues. A micro-level within-subject design was applied to get real time measures of the learning behavior at work. After filling in the HEXACO personality inventory, participants were sent four questionnaires per day to assess their learning behavior and work situation. No significant results were found for the expected relation between personality and learning at work, but Openness to Experience, when activated, had a significant relation with Knowledge Creation. The major weakness of this study was the small sample size and, thereby, low power of the analyses. Future studies are advised to continue to apply a micro-level design and to generate a bigger sample size, to get more generalizable results.

Keywords: Proactivity, HEXACO, Self-directed Learning, Social Learning, Knowledge Creation

For my mother and my father.

Your regardless love, trust, and support gave me the confidence to get where I am now.

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Acknowledgements

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1. Introduction

Due to the globalization and computerization of the world, environments and markets are changing constantly at a fast pace. Caused by this challenging development, it has been suggested that it is important that employees of organizations continuously learn new skills in order to be able to cope with the new demands arising from the globalization. This would help the organizations to develop constantly, and, thereby, adjust to new challenges (Sessa, & London, 2015).

This learning process does not, in the first place, refer to learning new knowledge from books, the internet, or a training and applying it; but constantly learning and developing skills on a daily basis. Furthermore, this learning process might include knowing which skills and knowledge already exist in the organization, and whom to approach to learn such skills or knowledge (Sfard, 1998).

The way employees learn and develop at work might be related to their personality, which possibly is a curtail factor for workplace learning. Furthermore, the way people learn at work might not just be influenced by the personality, but also by the environment, in which people are working in, and peoples work situation. Different environments and work situations might have effect on the way people express their personality, and, thereby, their learning behavior.

To be able to understand learning at work and to let employees and organizations work more efficiently, the aim of this paper is to gain new insight into how people learn at work, and how a work context may have an influence on this learning and development process. The study is conducted by investigating how the personality of the employees relates with their learning behavior at work and how this relation may be strengthened by trait activation.

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1.1. Theoretical Framework

1.1.1. A Proactive Personality

It is important to understand the possible relation between a Proactive Personality and learning at work. A proactivity personality refers to "[…] the relative stable tendency to effect environmental change" (Bateman, & Crant, 1993). As this definition shows, proactive people act independently and try to be the source of change in the environment they are acting in. Learning might be part of the environmental change, as is referred to in the definition.

It might be helpful to understand the three personality traits a proactive personality consists of. The HEXACO model of personality and the models engagement facet, as found in the study of De Vries, Wawoe, and Holtrop (2015), support that proactivity consists of the personality traits Extraversion, Conscientiousness, and Openness to Experience.

The HEXACO model of personality, from which the three proactivity personality trait are taken from. Opposite to the more widely used five-factor Big Five model of personality, the HEXACO model of personality consists of six personality factors. The personality traits of Conscientiousness, Extraversion, and Openness to Experience are mainly the same in the HEXACO model of personality, as in the Big Five model of personality. However, the HEXACO personality traits Honesty- Humility, Agreeableness and Emotional are more widely found in the data than the Big Five personality traits of Neuroticism and Agreeableness (Ashton, & Lee, 2007). This can also be seen in several more recent lexical studies, which rather support a six-factor solution than a five-factor solution for personality (Ashton, Lee, & De Vries, 2014; De Vries, Tybur, Pollet, & Van Vugt, 2016). All in all, this information is an overview of the HEXACO model of personality in order to be able to understand the origin of the three proactiveness personality traits.

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According to Ashton et al. (2007), in the HEXACO model of personality, Conscientiousness is described as "organized, disciplined, diligent, careful, thorough, precise versus sloppy, negligent, reckless, lazy, irresponsible, absent-minded". Conscientious people are aware of their responsibilities and work very disciplined on tasks and challenges. Extraversion is described as "outgoing, lively, extraverted, sociable, talkative, cheerful, active" versus shy, passive, withdrawn, introverted, quiet, reserved". Extraverted people enjoy to meet new people, to be in contact with individuals and social groups, and to socialize. Openness to Experience is described as "intellectual, creative, unconventional, innovative, ironic versus shallow, unimaginative, conventional". So, people scoring high on Openness to experience are creative and think outside of the box. Taking all this together, a proactive personality is outgoing, creative and aware of his or her responsibilities.

As already shortly mentioned above, a proactive personality might somehow be related to learning. This assumption can be supported by scientific literature; for example, Tornau and Frese (2013) found in their study that a proactive personality is not just related to higher engagement in learning in classroom settings, but it is also related to self-directed learning outside the classroom (Sidelinger, 2010), and a higher job performance in general. Thus, people with proactive personalities, scoring high on Extraversion, Conscientiousness, and Openness to Experience, are expected to learn more in classrooms, but also outside of classrooms, which might include learning at work as well.

Even though studies support the relation between proactivity and learning behavior, this relation is not as clear as it might seem. The literature review by De Raad and Schouwenburg (1996) states that the literature dealing with personality and learning of the last century does not support this link without any doubt. Even though the findings of De Raad et al. (1996) state that

the link between personality and learning is not that straightforward, they found strong arguments

for the involvement of the personality trait of Conscientiousness in learning.

A more recent study by Major, Turner, and Fletcher (2006) does not just support the link

between a proactive personality and the three personality traits of Conscientiousness, Openness to

Experience, and Extraversion; but was also able to link the three personality traits to the motivation

to learn. This study supports the previously assumed relation between proactivity and learning at

work.

In order to better understand this relation, the first *Hypothesis*, which is tested in this study,

is:

H1: A proactive personality is positively related to learning at work.

1.1.2. Learning at work

As mentioned before, a proactive personality and learning at work might be linked with each other.

In order to investigate learning at work in more detail, learning at work is split up into different

ways of learning; each of this ways is linked to one of the three personality traits associated with

proactivity.

The findings by Tynjälä (2008) suggest that the three different ways of learning could be

organized into a process of workplace learning. Tynjälä (2008) discusses in the review about

learning at the workplace different phases and levels of learning. One phase Tynjälä (2008) is

refereeing to is individual learning. In the individual phase of learning, the intention to learn plays

an important role. This means that for learning to occur personal motivation is needed. However,

Tynjälä (2008) states that learning at the workplace must not be understood through "[…] the

mainstream conceptualizations of learning, which have been developed in the context of school

learning […].", but as"[…] a social process." These statements show that learning at work does

not primarily refer to trainings of courses, but rather to unorganized, often social learning activities, which can occur during work.

The last phase of workplace learning refers, according to Tynjälä (2008), to Sfard's (1998) metaphors of learning. Those metaphors are the *acquisition metaphor*, which focuses on the gain of new knowledge, and the *participation metaphor*, which focuses on the social aspect of learning. Both learning metaphors are applicable to workplace learning. As argued before, most work place learning occurs in social contexts, which is also described in the participant metaphor. Additionally, as described in the acquisition metaphor, knowledge learned at work is often new to the employees, which enables them to come up with innovative ideas.

Tynjälä (2008) differentiates between the individual level of learning, which mostly refers to the intention to learn, the social level of learning, which describes the process of learning, and the kind of acquired knowledge, which is mainly new knowledge, in order to be innovative. This phases of the learning process at work are referred to in this study as *Self-Directed Learning*, *Social-Learning*, and *Knowledge Creation.*

1.1.2.1. Self-Directed Learning

Self-Directed Learning (SDL) is often used as a synonym for self-regulated learning in scientific literature, and has been defined several times, always slightly differently, which leads to no consistent definition of this concept (Ellinger, 2004). In a definition, which fits the needs of this study, SDL refers to "[…] self-learning in which learners have the primary responsibility for planning, carrying out, and evaluating their own learning experiences" (Caffarella, 2000; Merriam & Clark, 1991). This definition shows that SDL is not just the learning itself, but also the independent planning and execution of the learning, which requires awareness of the necessity to learn and develop oneself.

Gijbels, Raemdonck, Vervecken, and Van Herck (2012) argue that the planning and independent execution of SDL plays an especially important role for workplace learning. So, it might be that a major proportion of learning at work happens in a self-directed manner.

Another argument, that Proactivity and SDL is related, comes from Brockett and Hiemstra (1991), who found in their study that a positive relation between SDL and personality exists, and Ellinger (2004) refer to SDL as "[…] a personality construct." This strengthens the already stated assumption that personality and learning behaviour in general, but specifically at work, are related with each other via SDL.

As mentioned before, the definition of SDL contains the planning of learning as well, which can also be found back in the definition of Garrison (1997). He refers to the planning of learning as self-management in his study. Someone, who is good at self-management, according to Garrison (1997) "[…] is concerned with task control issues. It focuses on the social and behavioral implementations of learning-intentions, that is, the external activities associated with the learning process. This dimension concerns the enactment of learning goals and the management of learning resources and support." Even though this statement might also reflect the importance of extraverted personality traits, it rather refers to the organization and management of self-directed learning.

The skill to organize and manage is part of the personality trait of Conscientiousness, which is defined, according to Ashton et al. (2007), as *organized* and *disciplined*. In order to self-manage learning, it is important to be organized and disciplined, to be able to plan learning, to be aware of which skills and knowledge are needed and how to approach this sources.

Since a major part of SDL is the self-organizational aspect, and this aspect comes back in the personality trait of Conscientiousness, the second *Hypothesis* states:

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H2: Conscientiousness is positively related to intentional, self-directed learning.

1.1.2.2. Social Learning

According to Rieber (2012), Social Learning (SL) is defined as "[…] norms, attitudes, expectations, and beliefs arise from an interaction with the cultural or social environment around an individual." A more direct definition, which is given by Rieber (2012) as well, is that "[…] people learn from their observations of individuals or models." This definition states that a big part of learning occurs during social interaction with other people.

Extraverted people engage more often in situations in which they can interact with others, which makes SL for them more likely to occur. Additionally, most jobs require people to interact with their colleagues and to work in teams, which makes the workplace a good environment for people to engage in SL.

This was also found in a study of Kao and Craigie (2014), in which Taiwanses university students, who scored high on Extraversion, learned English faster on facebook, than their peers, who scored low on Extraversion. An interesting aspect about this study is that learning happened on facebook, which is a social network. The results of this study support the assumption that Extraversion and SL are related with each other.

Furthermore, the personality trait of Extraversion could be seen as motivation for people, on the one hand, to get in contact with other people, and to learn during this contact, or, on the other hand, to get access to information, which they might need to solve a problem or to deal with a challenge more easily. This might happen, for example, in a situation, in which the knowledge or expertise of a colleague is needed by an employee in order to complete a task.

The link between Extraversion and SL can be found in the scientific literature, which leads to the fourth *Hypothesis*:

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H3: Extraversion is positively related to learning in a social context.

1.1.2.3. Knowledge Creation (KC)

The knowledge learned at work is mostly new to the employee, according to Jarvis (1992). The need to create new knowledge is urgent, because KC might lead to innovation and development of products and services of companies. However, KC might be linked to the personality trait of Openness to Experience, because people scoring high on this personality trait are characterized as *creative* and rather applying *unconventional* solutions for problems. *Creativity* and *unconventional* solutions might contain the creation of knowledge.

Furthermore, *openness to experience* can be linked to the *motivational* aspect of KC. People might be motivated so engage in KC through being creative and not to proceed tasks in conventional ways, but search for unconventional ways and might learn during that search. As shown, Openness to Experience and KC might be related to each other, which is the reason why *Hypothesis 4* is:

H4: Openness to experience is positively related to knowledge creation.

1.1.3. Trait Activation

The relation between personality and learning at work is largely supported by the scientific literature, which is discussed in the paragraphs above. Since work place learning occurs in an environment, which is not primarily designed for people to learn in and, which is changing on a day to day basis, it is important to take this environment and its influence on learning into consideration. An attempt to understand the influence from the environment and the work situation on learning at work is the theory of trait activation.

Trait activation refers to the expression of personality traits "[…]as response to trait-relevant situational cues" (Tett & Cuterman, 2000). Trait relevant cues are cues, which trigger the

expression of a certain personality trait. This means that for people to express their personality in a certain situation, it is important that the situation holds trait-relevant cues, which stimulate the personality trait. Trait relevant cues need to be understood by the person as such and attract the person to engage in the given situation. Those trait relevant cues can come from the environment people are working in, as well as their work situation.

In order to clarify trait activation, an example is given. For a highly extraverted person at a party, people who are unknown to this person might be a trait-relevant cue, because unknown people might trigger the extraverted personality of the person and this might result in the desire to get in contact with the unknown people.

Tett and Burnett (2003) state in their *Personality Trait-Based Model of Job Performance* that trait-relevant cues exist on organizational, group, and individual level within an organization. Due to the fact that trait relevant cues are present all different levels of an organization, it might be expected that certain trait relevant cues, when present, stimulate engagement and learning at work as well. So, trait activation might strengthen the relation of a proactive personality and learning at the workplace, specifically SDL, SL, and KC.

This leads to *Hypothesis five* to *seven*:

H5: The relation between Conscientiousness and SDL is strengthened when Conscientiousness is activated by trait relevant cues coming from the work environment or the work situation.

H6: The relation between Extraversion and SL is strengthened when Extraversion is activated by trait relevant cues coming from the work environment or the work situation.

H7: The relation between Openness to Experience and KC is activated by trait relevant cues coming from the work environment or the work situation.

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2. Methods

2.1 Design

A within subject correlational design was applied with Proactivity, but also the (proactive) personality traits (Extraversion, Conscientiousness, Openness to Experience) as independent variables. The dependent variables were the total learning week, SDL, SL, and KC; and the level of trait activation (TA Extraversion, TA Conscientiousness, TA Openness to Experience) were the moderator variables.

2.2 Participants

52 participants took part in this study. Three participants had to be excluded, because they did not fill in the HEXACO personality questionnaire, so no data about their personality was available. Additionally, *20* participants were excluded from the analysis, because they filled in less than eight Learning Reports or less than three Trait Activation questionnaires, which left a sample of *29* participants.

Eight of them were male (*27.6%*), and 21 of them were female (*72.4%*). The average age of all participants was *39.1* years (*SD = 12.15*). None of the participants had a low level of education (lower, than a high-school degree), *1* participant (*3.4%)* had an average level of education (high school degree), and *28* participants (*96.6%*) had a high level of education (Bachelor and higher). The average working hours, according to the participants work contract, were *29.34* hours per week (*SD = 12.00*), while *37.9%* participants worked full time, which was 40 hours per week or more.

Table 1 provides a more detailed overview over the demographics of the sample of this study.

Table 1

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Demographics Sample (Age, Gender, Education, Country, Work Sector, Current Work Situation) ($N = 29$)

Variable	Mean	SD	Categories	Percentages
Age	39.1	12.15		
Gender	-	-	Man	27.6%
			Woman	72.4%
Education			High School (HAVO/ VWO/ Abitur)	3.4%
			Bachelor	55.2%
			Master	41.4%
Country			Netherlands	13.8%
			Germany	6.9%
			Greece	65.5%
			USA	3.4%
			Indonesia	3.4%
			Ireland	3.4%
			New Zeeland	3.4%
Work Sector			Accounting, Banking and Finance	3.4%
			Business, Consulting, and Management	3.4%
			Engineering and Manufacturing	6.9%
			Healthcare	6.9%
			Hospitality and Events Management	3.4%
			Information Technology	6.9%
			Public Services and Administration	13.8%

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		Recruitment and HR	3.4%
		Teacher Training and Education	44.8%
		Research Institutes	6.9%
Current Work Situation		Payroll (fixed term contract)	55.2%
		Payroll (open-ended contract)	27.6%
		Freelance worker	6.9%
		Other	10.3%

2.3 Apparatus/ Materials

HEXACO-PI-R

The English version of the HEXACO-PI-R with 100 items was used to assess personality (*Appendix A*). Each item was answered by the participants on a Likert-scale from one (totally disagree) to five (totally agree), with three (neutral). The six personality traits, Honesty-Humility (H), Emotionality (E), Extraversion (X), Agreeableness (A), Conscientiousness (C), and Openness to Experience (O), were covered in this questionnaire with 16 questions each. Four items measured the Altruism facet.

Proactivity

The Proactivity scale (De Vries, Wawoe, & Holtrop, 2015) contained eight items, which were answered on a Likert-scale from one (totally disagree) to five (totally agree), with three (neutral) (*Appendix B*). The proactivity scale was developed by the researchers in such a way that it would better reflect Extraversion, Conscientiousness and Openness to Experience than other proactive personality questionnaires.

Learning at work

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Learning at work (SDL/ SL/ KC) were measured by 9 questions taken from the *Structured Learning Report* (Endedijk, 2010) (*Appendix C*). This questionnaire measures learning at an experience level, which means that the questions asked in the Learning Report asked the participant to report concrete learning experiences.

Question one and two measured, whether the participant had a learning experience or not. Based on these questions, the total learning week variable was computed. Question eight and nine measured the level of self-directedness of the learning experience. Based on these questions, the SDL variable was computed. Question six measured whether the learning experience was a SL or not. KC was measured by a point in a coordinate system, which the participant marked through touching the screen of their mobile device. The y-axis measured whether participants elaborated their already existing knowledge, or whether they created new knowledge.

Trait activation

Trait activation was measured by a three items questionnaire (*Appendix D)*. The questionnaire asked participants to rate their work situation and their work environment during a work day on a Likert-scale from one (totally disagree) to five (totally agree), with three (neutral). This questionnaire measured trait activation on a daily level, at the end of each workday.

2.4 Procedure

The data was collected in two different weeks. In the first week, 40 people participated in the study; in the second week another twelve participated. Other than the different week in which the data was collected, the procedure stayed the same.

The population for this study was generated by asking members of the researcher's personal networks to participate in the study. Therefore, the link of the study was either sent by mail to friends and colleagues of was shared on social media platforms, such facebook.com and

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linkedin.com. After participants followed the link to the study and accepted the informed consent, participants were asked to provide information about their demographical background. Next to the questions about gender, age and nationality, questions about the job they were working in and the number of hours they worked per week were asked.

First, participants had to fill in the HEXACO-PI-R questionnaire. The proactivity questionnaire, which consisted of 8 items, was added to the HEXACO-PI-R questionnaire, so participants could not distinguish between the two questionnaires. Both questionnaires were completed online by the participants on their personal computer or mobile device. After finishing the HEXACO-PI-R questionnaire, the participants were added to a mailing list.

The second part of the study started on a Monday and ended on Friday of the same week. Four questionnaires were sent to the participates per day via mail. The mails were sent to the mail addresses listed in the mailing list. The first three questionnaires were named Learning Reports and asked the participants to assess their learning behaviour in the last two hours. The last questionnaire was named Trait Activation and asked three questions about the work situation and the working conditions, in which the participant worked on that day. The Learning Moments were sent to the participants at 11:00 A.M., 1.30 P.M., and 4.30 P.M. every day. The Trait Activation questionnaire was sent at 5:15P.M.

After the week was over, the participants received an email, in which they were thanked for their participation.

2.5 Statistical Analysis

All to-be-reversed items from the HEXACO survey, the proactivity survey and the trait activation surveys were recoded, so each 1 (totally disagree) was changed to a 5 (totally agree), each 2 (disagree) was changed to a 4 (agree) and so on.

After reversal of the items, means (e.g., Extraversion, Conscientiousness, and Openness to Experience) were calculated from the items. A proactivity mean was calculated from the proactivity survey and a trait activation mean for Extraversion, Conscientiousness, and Openness to Experience for each day.

The total learning week variable was a binary variable, and was calculated by adding up all positively answered learning experiences. Since 15 learning moments were send to the participants during the whole week, a maximum score of 15 could been reached by the participants, when they answered every learning moment positively.

The SDL variable was calculated by coding the answers of *Q7* and *Q8* in order to assess the level of self-directedness of the learning reported. In order to calculate the values for the level of self-directedness for each day or the whole week, the mean of all three SDL measures was calculated. This was done by dividing the added values of the variables by the amount of reported measures. For example, in order to calculate the mean for SDL for Monday, if the first two SDL measures were filled in and the last was missing, the two added SDL measures were divided by two in place of three, because one value was missing. This was done, because the self-directedness of a learning moment had nothing to do with how often someone learned. One might learn very seldom, but in a highly self-directed manner.

The SL variable was calculated by adding all learning moments, in which the participant learned in a social context, and dividing this number by the number of learning moments per week. This variable is the percentages of learning moments, which took place in a social setting. Last, KC is the value of the y-axis of a coordinate system. The y-axis went from 'expanding already existing knowledge' to 'gaining new knowledge'. The higher the participant rated his learning experience on the y-axis, the newer was the knowledge he or she gained.

Due to the fact that some Learning Reports were forgotten by the participants or in many Learning Reports participants stated that they did not learn anything, missing values have to be dealt with before analysing the data. Missing values got the value zero, so that the sum and mean scores could be calculated without any disturbance.

Cronbach's Alpha was calculated for the variables, and the distribution of the variables was analyzed by conducting the Shapiro-Wilk test of Normality and controlling for the skewness of the distribution.

For the analysis of the data for the *Hypothesis 1* to *4*, a Pearson correlation was applied. For conducting the analysis for the *Hypothesis 5* to *7*, a linear regression was performed. Due to the high likeliness that multicollinearity may occur, the variables, from which the moderators were calculated, were not standardized before calculating the moderators. They were not included in the model, which meant, that the linear regression was just calculated between the moderator variable and the dependent variable.

Due to the fact that the analysis for *Hypothesis 5* to *7* had to be conducted on a daily level, the data were restructured. The restructuring of the data made analysis on a daily level possible, instead of an individual level. This was done by taking the values for trait activation of Extraversion, Conscientiousness, Openness to Experience, SLD, SL, and KC for each day as target variables, which means that each of them became one single variable. SDL Monday, Tuesday, ect. became just the variable SDL, instead of being five different variables. Conscientiousness, Extraversion, and Openness to Experience were included as fixed variables, because they were constant. This meant that they did not change from day to day, while the target variables were changing from day to day.

Since the number of participants in this study, whose data is usable for analysis, was relatively small (*29*), the power of the analysis was relatively low as well. The power of a statistical test described the chance that the null hypothesis was rejected correctly, so a high power level was desirable. For a high level of test power, the significance criterion and the desired effect size played a role. To meet a significance criterion *p<.05*, with a medium effect size of *0.25*, and a test power of *.9*, a minimum of 164 participants would have been needed in order to be able to get significant results within these parameters. When the expected power with these parameters for a sample size of 29 participants, which was the sample size of this study, was calculates, an expected power of *.37* was the result, which is not satisfying at all.

The effect of restructuring the data for *Hypothesis 5* to *7* was that each measure, even though it came from the same participant, was treated as if it came from different participants. Since five measures per participant were used, the number of artificial participants was five times higher than the actual one. This effected the power of the tests, which was a problem, because the number of participants did not change; the data was just restructured and analyzed in a way, in which the sample size artificially became bigger, even though this was not the case in reality.

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3. Results

First, the alpha-reliabilities of the scales were computed to see whether the scales measured the same construct. The scales for Extraversion (α = .75), Conscientiousness (α = .74), and Openness to Experience (α = .82) contained 16 items each. All the alpha reliabilities were satisfying. Two scales for measuring a proactive personality were applied. The first one was based on the HEXACO measurements of Conscientiousness, Openness to Experience and Extraversion (α = .39). The second one, the proactivity scale, consisted of 8 items (α = .83).

The low alpha reliability for the HEXACO proactiveness measure was not unexpected, because it was based on three scales, which measured three different personality traits (Extraversion, Conscientiousness, and Openness to Experience). The relation between the HEXACO proactivity scale and the proactivity scale was positive (*r = .77; p = .00*), which validated both measures.

Second, before the hypothesis were tested, the data were controlled for the normality of the distribution of the variables to decide whether parametric or non-parametric tests had to be applied. When the distribution of the variables was checked, most of the variables were parametrically distributed. Only the variable total learning week (*p = .02*) seemed to be non-parametrically distributed. Its skewness value lied between -1 and 1, which was not a strong violation of normality, and, thereby, provided sufficient justification for the use of parametric tests. *Table 2* shows the distribution of the variables, their means and standard deviations, and their alpha-reliabiliteis.

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Table 2

Test of Normality and Descriptive Statistics

Variable	Shapiro-Wilk		Descriptive Statistics		
	Statistic	Sig.	Mean	SD	Alpha-reliability
Proactivity Scale	.97	.67	3.69	.58	.83
Proactivity HEXACO	.97	.57	3.70	.31	.39
Extraversion	.96	.38	3.48	.43	.75
Conscientiousness	.97	.62	3.99	.41	.74
Openness to Experience	.94	.12	3.64	.55	.82
Total Learning Week	.91	.02	9.06[a]	4.21	-
Social-Learning	.90	.40	.36	.24	-
Self-Directed-Learning	.96	.37	1.62[b]	.36	-
Knowledge creation	.93	.07	92.90[d]	47.01	-

Note. df. = 29 for all variables, Sig. > .05 means that the data is normally distributed. All non-marked scales are Likert-Scales from one to five. [a] The scale reached from zero to 15. [b] The scale reached from zero to three. [c] The scale reached from zero to one. [d] The scale reached from zero to 200.

Hypothesis 1, 2, 3, and *4* were analyzed on a week level, because they had to provide information about the relation between personality and learning at work in general.

Hypothesis 1 was rejected. Regardless whether the proactivity score was calculated from the HEXACO proactivity variable (*r = .15, N = 29; p = .42*), or the proactivity variable based on the proactivity scale (*r = .04, N = 29; p = .79*), no significant relation between proactivity and total learning during the week was found, so *Hypothesis 1* had to be rejected.

For *Hypothesis 2*, no significant relation was found between the personality trait Conscientiousness and SDL (*r = -.23, N = 29; p = .21*), which was the reason why *H 2* was rejected.

For *Hypothesis 3*, no significant relation between the personality trait Extraversion and social learning was found (*r = .10, N = 29; p = .60*), which meant that *H 3* had to be rejected.

For *Hypothesis 4*, no positive relation was found between Openness to Experience and the weekly level of KC (*r = .31, N = 29; p = .10*).

All correlations were shown in *Table 3*. *Table 3* contained many significant relations between the personality traits and the proactivity measures, which was not surprising, because the HEXACO proactivity measure was calculated from the proactivity personality traits. These findings supported the assumption that proactivity was related with Conscientiousness, Openness to Experience and Extraversion. Furthermore, *Table 3* showed that the different ways of learning were significantly related with each other, which was not surprising, because one learning experience could have been social learning and self-directed learning at the same time.

Table 3

Correlation Matrix

Variables	Age	Gender	Extraversion	Conscientiousness	Openness to Experience	Proactivity Scale	Proactivity HEXACO	Total Learning Week	Self-Directed learning	Social Learning	Knowledge Creation
Age	-	.30	.13	-.18	-.14	.05	-.09	-.10	-.20	-.21	.10
Gender		-	-.27	.06	-.42[a]	-.29	-.34	-.38[a]	-.47[a]	.04	-.10
Extraversion			-	.16	.18	.71[a]	.64[a]	.11	.15	.10	.24
Conscientiousness				-	.18	.54[a]	.61[a]	-.20	-.23	-.04	-.22
Openness to Experience					-	.36	.74[a]	.39[a]	.33	-.06	.31
Proactivity Scale						-	.77[a]	.06	.00	.08	.13
Proactivity HEXACO							-	.19	.16	-.01	.19
Total Learning Week								-	.93[a]	-.13	.84[a]
Self-Directed Learning									-	-.15	.75[a]
Social learning										-	-.23
Knowledge Creation											-

Note: [a] correlation is significant at the 0.05 level.

Hypothesis 5, 6, and 7 were analyzed on a daily level, because SDL, SL, KC, and trait activation were day-specific measures, which means that they changed from one workday to the other, so, it was not consistent over the week.

Hypothesis 5 had to be rejected, because no significant linear regressions was found, which meant that the relation between Conscientiousness and SDL was not moderated positively by the activation of Conscientiousness ($b = .03$, $t(129) = .4$, $p = .68$).

Hypothesis 6 had to be rejected, because none of the regressions showed a significant effect for the moderation, so, the relation between Extraversion and SL was not moderated positively by the activation of Extraversion ($b = .04$, $t(129) = .45$, $p = .64$).

Hypothesis 7 was accepted, because a significant linear regressions was found, so, the relation between Openness to Experience and KC became positively significant, when it was moderated by the activation of Openness to Experience ($b = .2$, $t(129) = 2.58$, $p = .01$), with a post hoc calculated power of .8. The activated Openness to Experience trait explained a small proportion of variance, around 4% in the KC scores ($R^2 = .04$, $F(1, 128) = 6.7$, $p = .01$).

Table 3 showed the regression coefficients between the variables, which are stable during the week, such as the demographic variables of gender and age; and the personality traits. A significantly, negative regression between gender and SDL was found. The results can be found back in Table 5.

Table 4

Standardized Regression Coefficient on Person to Person level ($N = 29$)

	Dependent variables		
Independent Variables	Self-Directed Learning	Social Learning	Knowledge Creation
Gender (0, 1)	-.47 [a]	.25	.08
Age	-.03	-.22	.03
Conscientiousness	-.11		
Extraversion		-.07	

| Openness to Experience | | | .14 |

Note. [a] regression coefficient is significant at the 0.05 level.

Table 4 shows the Standardized Regression Coefficients on a daily level. Because all independent

variables differ from day to day during the week

Table 5

Standardized Regression Coefficient on Daily level (*N = 129*)

	Dependent Variable		
Independent Vairbale	Self-Directed Learning	Social Learning	Knowledge Creation
Trait Activation Conscientiousness	.07		
Trait Activation Extraversion		.04	
Trait Activation Openness to Experience			.17 [a]
Activated Conscientiousness	.03		
Activated Extraversion		.04	
Activated Openness to Experience			.2 [a]

Note. [a] regression coefficient is significant at the 0.05 level.

Consequently, for this study, all Hypotheses, but *Hypothesis 7,* had to be rejected, because no

significant effects were found.

DID YOU LEARN ANYTHING TODAY?

4. Discussion

The goal of this study was to test the assumption that the relation between personality and learning at work is positively influenced by the activation of personality through the environment or the work situation. In order to test this assumption, a micro-level within-subject online survey design was applied, which measured learning several times on a daily basis. The results of the study did not provide significant results for any of the hypothesis, but for *Hypothesis 7*, even though the relation between a proactive personality and learning is widely accepted in the scientific literature. A potential reason for that might be the low power of the statistical tests, due to the rather small sample size, which is the most influential shortcoming of this study.

The findings for *Hypothesis 1* to *4* stated that a proactive personality, on a between person level, did neither have a relation with learning at work in general, nor with SL, SDL or KC specifically. This would mean that the amount of learning at work was not related to personality whatsoever. It might have been related to other factors, which were not considered in this study.

The results for *Hypothesis 5* to *6* stated that the activation of personality by work situations or by the work environment did not strengthen the relation between personality and work related learning. Only *Hypothesis 7*, which stated that Openness to Experience, when activated, has a relation with KC could be confirmed.

This result fits the in the introduction discussed article of Tynjälä (2008), which stated that KC would be a major part of learning at work. Even though this study did not test whether KC occurred more often than other ways of learning, it shows that KC is an important part of workplace learning and it might be related to proactivity. Furthermore, Furnham, Jackson, and Miller (1999) found in their study that a proactive personality is strongly related to learning and development at work. They state that proactive employees do not just accept change and development coming from higher hierarchical layers of an organisation, but that they want to engage actively in the change and create it themselves. Those results are

mainly contrary to the findings of this study, because only one relation between proactive personality and learning at work found support in the data.

Naquin and Holton (2002) found a positive relation between Conscientiousness and learning at work, but not between Extraversion or Openness to experience to learning in their study. These findings should be seen critical, according to Naquin et al. (2002), because they are contrary to other scientific literature. However, their findings support the findings of this study for Extraversion, but not for Conscientiousness and not for Openness to Experience.

Hirst, Van Knippenberg, and Zhou (2009) found in their study that trait activation might have a positive relation with creativity and learning at work. Even though trait activation was not measured directly in their study, their results suggest a relation between trait activation and learning. The results of the study of Hirst et al. (2009) support the findings of this study, because the link between creativity (Openness to Experience) and learning at work, specifically, KC, has been found as well.

A possible reason why the result of this study only found partial backup in the scientific literature is that several shortcomings limit the validity of the results. First, the power of the regression between Openness to Experience and KC was high (.8), which is no surprise, because it was calculated on the restructured data set, in which the data was structured on daily level. Due to the restructuring, 129 participants were in these set, which explains the high power value. This power value provided little meaning for the results, because it is artificially high.

Second, it was demanding for the participants to complete the whole study, due to the sheer number of questionnaires, which had to be filled in. This might have been an explanation why almost 50% of the participants dropped out and why so many participants had to be excluded from the data analysis. Furthermore, this shortcoming was supported by feedback, which came from several participants. They argued that the number of questionnaires was overwhelming and some of them had difficulties filling all of them in.

Third, the sample for the study was build up by asking people out of the social network of the researchers to participate in the study, which resulted in a sample, in which a lot of people worked in the educational sector. The educational sector was overrepresented in this sample, thus did not reflect the number of people working in the educational sector in the real word. All of these shortcomings led to the point that based on the results of this study, no generalization for the relation between personality and learning at work could have been made.

Opposite to the shortcomings named above, this study had several strong aspects as well. Opposite to the design applied in the study of Majors et al. (2006), learning was not just measured by a single questionnaire and additional information gathered from an organisations database, but was gathered over a longer period of time with 15 different questionnaires during a week. This had the advantage that learning was not just measured by the participants assessment of his or her motivation to learn in one questionnaire, but that is was measured as it occurred on an everyday basis. Major et al. (2006) should try to replicated their findings, but apply a micro level design, as it was done in this study, instead of a single-questionnaire design.

Another strength was that the data gathered from the HEXACO questionnaire and the proactivity scale, despite of the small sample size, had a high alpha-reliability and was distributed normally, which supported the reliability of these scales.

First of all, based on the strengths of the study, for further research is recommended to continue applying the within-subject micro level design to gain new insight in how people learn at work. This design provides the chance to measure learning as it occurs, and not just the judgement of the participants about their learning, which could be biased, since learning might be seen as something desired by society from the participants.

Second, for future research is recommended to try to conduct the study with a bigger sample size, since this would improve the power of the tests. The improvement of the power of the tests would lead to

DID YOU LEARN ANYTHING TODAY?

more generalizable results, which might allow to drawn back conclusions to the real world. Not just a bigger sample size, but also more consistent data would lead to that goal. Therefore, it is recommended to encourage future participants to fill in as many questionnaires as possible and to try not to drop out of the study. Even though the number of participants and dropouts have been problems in social science ever since, it might be an important improvement to reward future participants for their participation. These actions might result in more consistent data and more valid and reliable results.

As shown in the results, participants stated that they learned nine out of 15 times on average during the week they participated in this study. This part of the results showed that learning at work is happening on almost any day and, almost, at any time. This is the reason why it might provide valuable information for organisations to monitor the learning behaviour of their employees for a longer time and analyse the gathered data in order to improve the development process of the whole organisation. When organisations are able to better understand the way their employees learn during work, they might be able to stimulate this learning process and support it, which would result in faster and more efficient independent learning at work.

Even though the results of this study are neither representative, nor significant, it should be seen as a pilot study on real time measurement for learning at work. This study was valuable to discover possible challenges one might encounter when conducting micro-level studies. The shortcomings discussed above provide important aspects future research needs to take care of in order to be able to find meaningful results.

The importance of understanding learning and development at work and the factors, which might influence it, must not be underestimated. According to Harrison, and Kessels (2004), the shift from a production economy to a knowledge economy has been the biggest shift for organisations since the industrial revolution. This makes Human Resource Development, whose major interest it is to stimulate learning and development in organisations, one of the major concerns for organisations nowadays,

DID YOU LEARN ANYTHING TODAY?

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DID YOU LEARN ANYTHING TODAY?

Appendix A: HEXACO-PI-R 100 items questionnaire

<div style="border:3px double black; text-align:center">

HEXACO-PI-R

(SELF REPORT FORM)

</div>

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DIRECTIONS

On the following pages you will find a series of statements about you. Please read each statement and decide how much you agree or disagree with that statement. Then write your response in the space next to the statement using the following scale:

> 5 = strongly agree
> 4 = agree
> 3 = neutral (neither agree nor disagree)
> 2 = disagree
> 1 = strongly disagree

Please answer every statement, even if you are not completely sure of your response.

Please provide the following information about yourself.

</div>

Did you learn anything today?

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.

Did you learn anything today?

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.

Did you learn anything today?

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.

Did you learn anything today?

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 hard-hearted person.

Did you learn anything today?

Appendix B: Proactivity Scale

1 (strongly disagree) to 5 (strongly agree)

1. I have well developed plans to improve things.

2. Wherever I go, I create positive Changes.

3. When I want something, I'll get it done.

4. Others more often than I take the lead in making new plans. (R)

5. I get a lot of energy at the thought that my ideas are carried out.

6. I shy away from opportunities to change my surroundings. (R)

7. If there is a problem, I tackle it right away.

8. I organize in detail all sorts of changes I want to implement.

Did you learn anything today?

Appendix C: Learning Moment Questionnaire

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

Did you learn anything today?

discussing something with others

getting feedback from others

seeking help or information from others

participating in a workshop, training or course

other

Q7   What other people were involved in this activity?

A colleague from my own team

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!

Did you learn anything today?

Appendix D: Trait Activation questionnaire

Openness to Experience and Conscientiousness are answered by a Likert-scale from one (totally disagree) to five (totally agree), with three (neutral)

Extraversion

1. Today, my job allowed me,

    1. ... to fully work on my own.

    2. ... to mostly work on my own.

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

    4. ... to mostly work with other people

    5. ... to fully work with other people.

Openness to Experience

1. Today, my job allowed me to develop new ideas.

2. Today, my job did not allow me to work in a creative manner. (R)

Conscientiousness

1. Today, my job allowed me to work disciplined on my tasks.

2. Today, my job allowed me to work in an unorganized manner (R)

Did you learn anything today?