

## Does Combination Matter? A Latent Profile Analysis of Experiences with (Non-)Digital Learning Offers and Basic Need Satisfaction at Work

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### Abstract

*In a digitalized world of work, learning is essential for employees. Organizations provide a variety of learning offers (i.e., offline classroom-based learning, e-learning, and virtual classroom-based learning). However, employees rarely use just one offer, but rather all offers to varying degrees, depending on individual opportunities and needs. We move away from a static view of learning offers and instead use a person-centered approach. The results of a latent profile analysis show that six Experiences with Learning Offers (ExLO) profiles exist. Based on Self-Determination Theory, we further explore the research question of the extent to which ExLO profiles are related to competence, autonomy, and relatedness need satisfaction at work. In particular, the most frequently represented profile, Versatile High Frequency Learners, shows the highest mean scores on the three basic need satisfaction facets and the strongest correlations with these facets. Implications for HR development practice and (longitudinal) research are discussed.*

**Keywords:** Digital learning, Self-Determination Theory, learning experience offers, skill development, learner profiles.

### 1. Introduction

In a digitized and connected world of work, employees need to continuously learn to cope with changing and increasing work demands, making employee development a priority for human resource management in organizations (Beer & Mulder, 2020; Gartner, 2019; Kolade & Owoseni, 2022; Watkins & Marsick, 2023; Williams, 2020). Such work-related learning occurs not only through formal training, but also informally and in a self-regulated way (Decius et al., 2023). Work-related learning has many

consequences such as job-specific and generic knowledge (see Smet et al., 2020, for a review). These outcomes can be traditionally divided into skill-based, cognitive, and affective learning outcomes (Kraiger et al., 1993). An example is that after training, employees not only gain more knowledge, but also attribute more competence to themselves and thus become more confident in coping with new challenges at work.

In line with Self-Determination Theory (SDT; Deci & Ryan, 2000; see also Rigby & Ryan, 2018), learning addresses and satisfies the work-related need for competence. In addition, SDT also includes the need for autonomy and the need for relatedness. For instance, learning can also lead to feeling more independent in completing work tasks (i.e., autonomy) or to feeling more confident and comfortable in social situations at work through increased contact with colleagues (i.e., relatedness). Need satisfaction is essential for productive and healthy employees, as it is linked to positive outcomes such as performance, work motivation and satisfaction, as well as lower stress and well-being (Van den Broeck et al., 2016).

According to the 3-P Model of Workplace Learning (Tynjälä, 2013), need satisfaction can be considered as a product of learning, while learning offers are considered as part of the learning context (presage level) that precedes the learning activities (process level; also see Antecedents-Process-Outcomes framework by Decius et al., 2021). However, we can assume that different learning offers are differently rich for subsequent need satisfaction. Learning offers that include a high digital component might satisfy the need for autonomy more than the need for relatedness due to more time flexibility of e-learning offers. Yet, in practice, employees usually do not take up only one learning offer, but an individual mixture of different offer types, such as traditional face-to-face or virtual classroom-based learning or e-learning.

Our study therefore addresses the question to what extent different patterns of participation in learning offers are related to the satisfaction of work-related

basic needs according to SDT. In particular, we contribute to the theoretical link between work-related learning and SDT. In doing so, we consider learning as a predictor of need satisfaction, whereas previous studies predominantly examined learning as an outcome of need satisfaction (e.g., Hsu et al., 2019; Sørensen et al., 2009). Our assumptions are consistent with the Work Design Growth Model (Parker, 2017), which classifies change in self-views and behaviors as a short-term learning outcome. Here we consider perceptions of need satisfaction in competence, autonomy, and relatedness. According to the model, these changes lead to self-development in the long term.

We respond to recent calls for further research on learning in digital settings (Gegenfurtner et al., 2020). The COVID-19 pandemic has acted as a catalyst for the introduction of technology-mediated digital learning opportunities in organizations (Radoslaw, 2022). Therefore, examining different learning offers in terms of their relation to psychological factors influencing motivation and wellbeing is even more of practical relevance.

Moreover, previous studies have mainly used learning-centered approaches, such as examining the effects of individual learning forms or learning offers (e.g., Arthur et al., 2003; Cerasoli et al., 2018; Decius et al., 2022), while person-centered approaches have been rather neglected. We consider learning from this person-centered perspective by using latent profile analysis to examine which combinations of learning offers are used by learners.

## 2. Learning offers in the digital workplace

Digitalization has led to fundamental shifts in how learning and training in organizations is designed, delivered, implemented and supported, leading to a large variety of learning environments with respective learning offers (Mikołajczyk, 2022; Schoop, 2023; Zur & Friedl, 2021). In addition to the traditionally dominant learning offer of classroom-based training, a variety of digital learning offers has become widely used (Gegenfurtner & Ebner, 2019; Sousa & Rocha, 2019; Moore et al., 2011). Learning offers can be differentiated along the dimensions of synchronicity and modality (Ebner & Gegenfurtner, 2019). Synchronicity pertains to the time aspect of the interaction occurring between instructors and learners (Chen et al., 2005). Synchronous learning offers allow for real-time and direct interaction, whereas asynchronous learning offers allow for interaction that is temporally delayed and indirect. The dimension of modality refers to the delivery mode of the learning offer. Online environments make use of the Internet or computer devices to enhance the learning experience, while

offline environments rely on traditional analogue instructional methods without the utilization of digital tools and infrastructure. Based on their synchronicity and modality, learning offers can be categorized into four distinct groups: synchronous online, synchronous offline, asynchronous online, and asynchronous offline.

Beyond the dimensions identified by Ebner and Gegenfurtner (2019), learning offers can furthermore be distinguished along the level of guidance by an instructor. While synchronous learning offers have a high level of instructor guidance, asynchronous learning offers have a low level of instructor guidance, i.e., they are self-directed by the learners (Chou, 2002). For the purpose of this paper, we investigate three types of learning offers, as they represent the most common offers before and during the pandemic: offline classroom-based learning, e-learning, and virtual classroom-based learning (see Emerald Works, 2020; Bitkom & HRPepper, 2020).

Classroom-based learning refers to offline learning offers such as face-to-face training or classroom courses that take place synchronously and are guided by an instructor (Gegenfurtner & Ebner, 2019). It is a form of instructor-led training, in which learners and trainer are in the same physical space (Ebner & Gegenfurtner, 2019) and learners are didactically guided through the course by the trainer.

E-learning refers to digital learning offers that are accessible on demand, take place asynchronously and are not guided by an instructor. Communication can take place in the form of questions or comments posted to forums, but lacks immediate feedback. These learning offers do furthermore not allow for extensive multilevel interaction between instructor and participants (Marjanovic, 1999). Examples are self-paced e-learning courses accessible through a learning management system (Gegenfurtner & Ebner, 2019; Fontaine et al., 2019; Kashive et al., 2021).

Virtual classroom-based learning refers to synchronous, technology-mediated classroom training, guided by an instructor which allows for direct and immediate communication with the instructor and other participants. Participants are connected live via a shared virtual platform that enables real-time voice and visual video-based interaction and allows for similar didactical activities as in offline seminars (Gegenfurtner & Ebner, 2019; Radoslaw, 2022). Terms used are webinars, web-based seminars, or virtual classroom-based training.

Research provides evidence for the use and effectiveness of the different types of learning offers in different settings. A meta-analytic comparison between face-to-face training and webinars showed both to be similarly effective but satisfaction with webinars was lower than satisfaction with offline training (Gegenfurtner & Ebner, 2019). A meta-analytic

comparison between webinars, online and face-to-face instruction (Ebner & Gegenfurtner, 2019) showed that webinars led to descriptively more learner knowledge than asynchronous online and face-to-face instruction, yet learner satisfaction was highest for face-to-face instruction.

Practitioner-oriented global learning surveys show that these learning offers have been provided in companies to a different extent over the years. Whereas offline classroom training was the predominantly provided learning offer for a long time, digitalization efforts and the pandemic have led to an increase in online learning offers in higher education and corporate learning settings (Dos Santos, 2022; Emerald Works, 2020; Wuppertaler Kreis, 2022). Even after the pandemic, these online learning offers are still in use in organizations, providing learners with the opportunity to engage in a variety of different online and offline learning offers (e.g., Future learn, 2022; Mikołajczyk, 2022). However, to our knowledge, there has been no research into whether learners have different patterns of engagement with these learning offers and have thus gained different levels of experience with combinations of learning offers over the years, reflecting the lack of a person-centered approach. It is still unclear to what extent there are systematic differences in the experience with learning offers (abbreviated as ExLO in the following text).

In our study we therefore investigate the following exploratory research question:

RQ1: Which different “experience with learning offers” profiles can be distinguished?

### **3. A Self-determination perspective on the experience with learning offers**

SDT (Deci & Ryan, 2000; Gagné et al., 2022) specifies three basic psychological needs: the need for autonomy, competence, and relatedness. The need for autonomy refers to the need to feel as an agent of one's own behavior and to experience a sense of volition. The need for competence refers to a person's desire to feel effective and master their environment. The need for relatedness refers to people's need to experience meaningful connections with others.

As mentioned above, the satisfaction of these basic needs at work is related to individuals' optimal functioning and well-being (Van den Broeck et al., 2016). If need satisfaction is that essential and work-related learning is a lever to influence need satisfaction, the question arises which ExLOs stimulate the satisfaction of need for competence, need for autonomy, and need for relatedness.

We assume that different ExLOs contribute differently to need satisfaction. Classroom-based learning as a learning offer guided by a trainer in presence in the classroom might be associated with low autonomy satisfaction because of the strong external pre-planning. In contrast, relatedness satisfaction is likely to be high due to the social classroom situation. Because of the high standardization of learning, individual competence satisfaction is likely to be lower than in other learning offers.

E-learning, on the other hand, is highly individualized. Employees select their own learning elements from the virtual environment and can work on them at a freely chosen time. As a result, both competence and autonomy satisfaction should be highly pronounced. However, since e-learning usually takes place without social contact with colleagues, relatedness satisfaction should be low.

Virtual classroom-based learning is similar to traditional face-to-face classroom learning in terms of high standardization and predetermined structure. Therefore, we would expect medium competence satisfaction and low autonomy satisfaction. Relatedness satisfaction should be higher than in e-learning, but lower than in traditional classroom learning, since the other participants are only virtually present, making it difficult to interact with each other during the training, e.g., in group work, but specifically difficult to engage in informal interaction.

We might thus be inclined to deduce hypotheses for the connections along our reasoning according to the learning offers. However, this would not be in line with the person-centered approach, which is theoretically and practically significant and has been neglected so far (Bell et al., 2017; Spurk et al., 2020). Furthermore, it would also ignore a crucial feature of work-related learning: ExLOs almost never occur in pure form in real-world settings (Emerald Works, 2020; Mikołajczyk, 2022). Few employees experience traditional training exclusively while never participating in virtual events, especially in the post-pandemic era characterized by digital transformation in organizations. Similarly, there are few employees who learn exclusively virtually (whether synchronously or asynchronously) and never attend face-to-face training. Thus, most employees experience a custom mix of learning offers. But which mixes of different ExLOs are particularly conducive to satisfying needs? Our research questions are therefore:

RQ2: Which ExLO profiles are related to competence satisfaction at work?

RQ3: Which ExLO profiles are related to autonomy satisfaction at work?

RQ4: Which ExLO profiles are related to relatedness satisfaction at work?

## 4. Method

### 4.1. Data collection and Questionnaire

Data reported in this study was collected as part of a larger online survey conducted within one large company from the German transportation sector. Data was collected in February and March 2023. Ethic committee approval was obtained for the research design from the ethic committee of one of the authors' institutions. The instruments of the questionnaire used in this study are briefly described below.

*Experiences with Learning Offers (ExLO):* We measured experience with learning offers with three items, asking participants to indicate the frequency in which they had experienced classroom-based training, e-learning, and virtual classroom-based learning on a four-point Likert-scale from 1="no experience/do not know", to 4="frequently".

*Basic need satisfaction at work:* We used 10 items developed by Van den Broeck et al. (2010) to measure basic need satisfaction. Need for autonomy (e. g., "I feel free to do my job the way I think it could best be done";  $\alpha = .81$ ) and need for relatedness (e.g., "At work, I feel part of a group";  $\alpha = .73$ ) were assessed with three items each and need for competence was assessed with four items (e.g., "I am good at the things I do in my job";  $\alpha = .91$ ). Participants were asked to rate the items on a six-point Likert-scale from 1="do not agree at all", to 6="completely agree".

*Sociodemographic data:* We assessed gender, age (in categories), and educational background.

### 4.2. Sample

Participation in the company-wide online survey was open to all employees. Employees were informed about the survey through different company communication channels as well as their supervisor. Participation was voluntary. Of the 4488 questionnaires, only participants who had provided information on their experiences with learning offers were included in the sample, resulting in a final data set of  $N = 3385$ . Of these participants, 57.15% were male, 31.21% female, and 1.39% classified themselves as non-binary. For reasons of anonymity, age was surveyed in the following categories (percentage distribution in brackets): 16–23 years (5.35%), 24–31 years (13.86%), 32–39 years (18.59%), 40–47 years (17.88%), 48–55 years (19.27%), 56–63 years (13.98%), 64–71 years (1.06%), and 10.02% did not indicate their age. Concerning the educational

background, 0.33% did not (yet) finish any systematic vocational education, 14.86% finished vocation oriented secondary school, 9.99% finished academic oriented secondary school, 27.75% had a completed vocational education, 35.93% indicated a graduate academic degree, and 11.14% did not provide any information on their educational background.

### 4.3. Statistical Approach

We used the statistical software R (version 4.1.0) with the Package mclust (version 6.0.0) to conduct the latent profile analysis of the experience with the three learning offers (i.e., classroom-based learning, e-learning, and virtual classroom-based). JASP (version 0.14.1) was used to calculate correlations and to conduct a confirmatory factor analysis. This confirmatory factor analysis confirmed the assumed three-factor structure of basic need satisfaction, showing an excellent model fit ( $\text{Chi}^2 = 260.50$ ,  $\text{df} = 31$ ,  $p < .001$ ;  $\text{CFI} = .99$ ;  $\text{RMSEA} = .05$ ;  $\text{SRMR} = .03$ ; see Hu & Bentler, 1999).

## 5. Results

First, results of the latent profile analysis on the profiles are presented (RQ1), followed by the results on the mean comparisons and correlations of the profiles with work-related basic need satisfaction (RQ2-RQ4).

### 5.1. Latent profiles

Initial exploratory clustering suggested a six or seven latent profile solution. After an initial review of possible solutions by the research team, for reasons of parsimony and interpretability, the 6-profile solution was chosen which was then applied to the data. The six latent ExLO profiles that emerged from the data are shown in Figure 1. The profiles can be described as follows:

- Profile 1 (Versatile low frequency learners): These learners report low frequency experience with all three learning offers. This group makes up 20.35% of the sample.
- Profile 2 (Learners without virtual classroom experience): These learners report that they have no experience with virtual classroom-based learning, but to a medium extent they use e-learning. This group makes up 4.25% of the sample.
- Profile 3 (Asynchronous e-learning dominant learners): These learners have very frequent experience with (asynchronous) e-learning. They experience the other learning offers less

frequently. This group makes up 15.86% of the sample.

- Profile 4 (Versatile high frequency learners): These learners report high frequency experiences with all three learning offers. This is the largest group which makes up 30.28% of the sample.
- Profile 5 (Classroom training dominant learners): These learners mainly report classroom-based learning and e-learning to a medium extent. This group makes up 24.14% of the sample.
- Profile 6 (Virtual classroom dominant learners): These learners have very frequent experience with (synchronous) virtual classroom-based learning and to a lower extent with the other two offers. This group makes up 5.11% of the sample.

## 5.2. Associations of latent profiles with basic needs

Concerning research questions 2, 3 and 4, analyses of variance revealed significant differences between the

six latent profiles of all forms of basic need satisfaction as displayed in Table 1. These were then examined using Bonferroni-adjusted post-hoc tests (see also Table 1). Pairwise comparisons on *autonomy* mainly showed that the autonomy scores of profile 1 were significantly lower than in profiles 3, 4, and 5. Pairwise comparisons for *relatedness* showed, among other things, that the relatedness scores of profile 4 were significantly higher than those in profiles 1, 2, and 5. Pairwise comparisons for *competence* showed that the competence values of profiles 4 were significantly higher than in profiles 1, 3, and 6. Overall, basic need satisfaction of profile 4 (versatile high frequency learners) had the highest mean values in all three basic needs which were often significantly higher than other profiles' mean values. In contrast, profile 1 (versatile low frequency learners) showed significantly lower mean values in several comparisons with other profiles.

Additionally, we computed bivariate correlations between the three learning offers (i.e., classroom-based learning, e-learning, virtual classroom-based learning) and the basic need satisfaction as well as the dummy coded six latent profiles. The results are displayed in Table 2. In general, the correlations of basic need

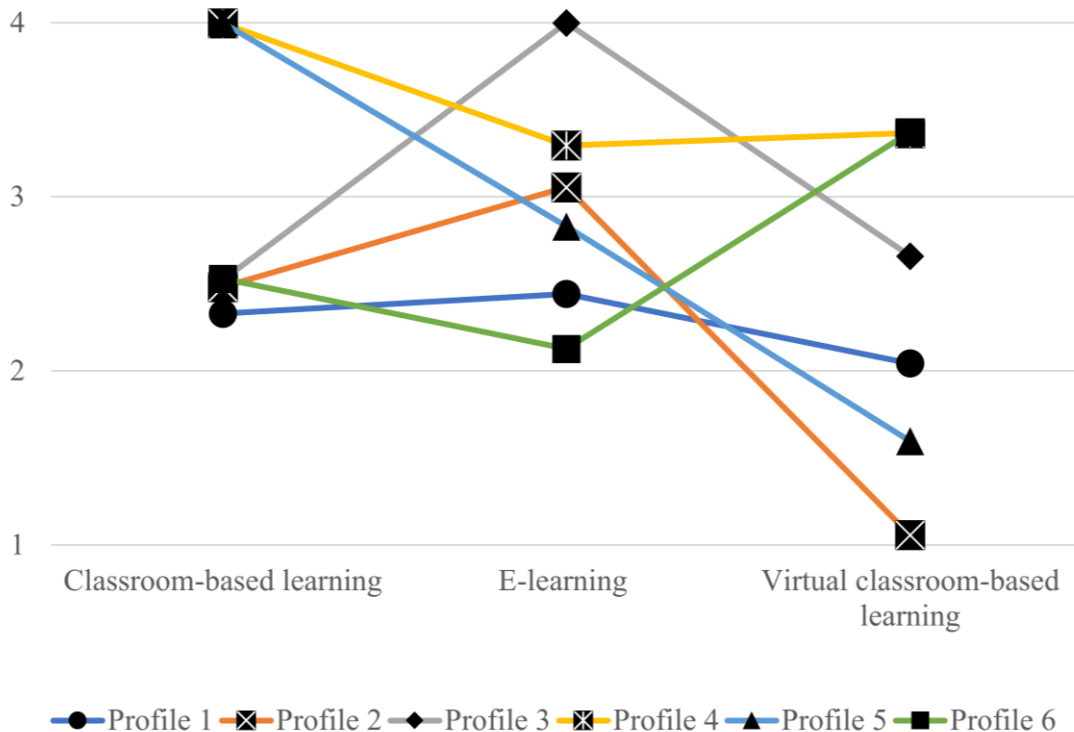


Figure 1. Six latent ExLO profiles

**Table 1: Means (M) and standard deviations (SD) of the basic need satisfaction for the six latent profiles, results of the analysis of variance (ANOVA) and post-hoc tests**

Profile	Autonomy		Relatedness		Competence	
	M	SD	M	SD	M	SD
1	4.10	1.08	3.94	1.05	4.68	0.82
2	4.24	1.01	3.91	1.06	4.78	0.77
3	4.38	1.04	4.15	1.06	4.80	0.75
4	4.53	0.96	4.35	0.97	4.92	0.69
5	4.32	1.01	4.12	1.04	4.82	0.71
6	4.29	1.06	4.03	1.04	4.68	0.82
ANOVA	F(5, 3102)=14.09, <i>p</i> < .001		F(5, 3123)=14.56; <i>p</i> < .001		F(5, 3096)=9.43; <i>p</i> < .001	
Post-hoc tests						
<i>p</i> < .05	2vs4		1vs3		3vs4	
<i>p</i> < .01	1vs5		-		1vs5, 4vs6	
<i>p</i> < .001	1vs3, 1vs4, 4vs5		1vs4, 2vs4, 4vs5		1vs4	

*Annotations: The results of the post hoc tests should be read as follows: The first entry 2vs4 means that the pairwise Bonferroni-adjusted mean comparison of profile 2 and profile 4 revealed a significant difference at the 5% significance level for the basic need satisfaction of autonomy.*

satisfaction and the six latent profiles are in line with the ANOVA findings: profile 4 is significantly positively and profile 1 significantly negatively correlated with all three basic needs (*p* < .001). Interestingly, profile 3 and profile 5 showed no significant correlations with basic need satisfaction, profile 2 (only relatedness, *r* = -.048, *p* < .01) and profile 6 (only competence, *r* = -.039, *p* <

.05) showed only one significant negative correlation. In contrast, the three learning offers (i.e., classroom-based learning, e-learning, and virtual classroom-based learning) are significantly positively correlated with all three types of basic need satisfaction.

## 6. Discussion

### 6.1. Theoretical Implications

Our results show that six different ExLO profiles emerge. In particular, the learning offer "virtual classroom-based learning" showed large differences between the profiles—profile 2 ("Learners without virtual classroom experience") and profile 4 ("Versatile high frequency learners") are far apart. The answer to RQ1 is that at least six different ExLO profiles can be distinguished, but two of these profiles (profile 2 and profile 6) rarely occur. "Versatile high frequency learners" (profile 4) are the most represented. This profile also showed the highest mean values for the three basic need satisfaction facets and the highest significant correlations with the basic need satisfaction facets.

In particular, the satisfaction of the need for relatedness is significantly higher in this profile than in the other profiles. Accordingly, those who learn with high frequency are also likely to be socially involved and to experience high levels of appreciation—especially since most work-related learning takes place in socially situated contexts (see Lave & Wenger, 1991). Likewise, individuals with this ExLO profile experience strong satisfaction of the need for competence.

**Table 2: Correlations of the different learning offers and profiles with basic need satisfaction**

	CBL	EL	VCBL	Rel	Aut	Com	CI1	CI2	CI3	CI4	CI5
Classroom-based learning (CBL)	—										
E-learning (EL)	.10***	—									
Virtual classroom-based learning (VCBL)	.18***	.33***	—								
Relatedness (Rel)	.15***	.11***	.14***	—							
Autonomy (Aut)	.12***	.11***	.12***	.49***	—						
Competence (Com)	.12***	.10***	.05**	.24***	.35***	—					
Cluster 1 (CI1)	-.51***	-.36***	-.22***	-.10***	-.12***	-.09***	—				
Cluster 2 (CI2)	-.20***	-.01	-.29***	-.05**	-.02	-.01	.11***	—			
Cluster 3 (CI3)	-.38***	.45***	.07***	.00	.01	-.01	-.22***	-.09***	—		
Cluster 4 (CI4)	.51***	.20***	.62***	.13***	.12***	.10***	-.33***	-.14***	-.29***	—	
Cluster 5 (CI5)	.44***	-.14***	-.49***	-.02	-.02	.01	-.29***	-.12***	-.25***	-.37***	—
Cluster 6	-.18***	-.24***	.20***	-.03	-.03	-.04*	-.12***	-.05***	-.10***	-.15***	-.13**

*Annotations: Significance levels: \* *p* < .05; \*\* *p* < .01; \*\*\* *p* < .001*

Employees who are high frequency learners may gain self-efficacy and experience positive competence in their everyday work, as well as receive positive feedback from colleagues and supervisors. Versatile low frequency learners (profile 1) report less satisfaction of the need for autonomy. Employees in this profile also exhibit negative correlations with the three basic need satisfaction facets. Thus, with respect to RQ2, RQ3, and RQ4, we found meaningful differences in the associations between ExLO profiles and competence satisfaction, autonomy satisfaction, and relatedness satisfaction at work.

However, the largest differences were found between employees from the profile that stands for much learning and employees from the profile that stands for little learning. Future research should therefore investigate whether the type of learning offer plays the main role in the relationship with need satisfaction, or whether the amount of learning is the decisive factor.

The results suggest that the person-centered approach using latent profile analysis better captures the reality of learning experiences than looking exclusively at the three learning offers classroom-based learning, e-learning, and virtual classroom-based learning in pure form. At this point, we echo the calls of other researchers to adopt a person-centered approach more often (e.g., Spurk et al., 2020). Overall, it appears that different ExLO profiles are related to need satisfaction to varying degrees. Future research could therefore take SDT (Deci & Ryan, 2000) more into account when considering different learning experiences, including digital learning experiences. Research should investigate the boundary conditions on which the associations between ExLO profiles and need satisfaction depend—for example, company-related factors such as number of employees or team size, personal variables such as Big Five personality factors, or situational variables such as learning culture and error climate. Basic needs could also be investigated further as a mediator between learning behaviors and learning outcomes. Furthermore, it should be investigated which learning activities lead to ExLOs, and how different forms of work-related learning (i.e., formal, informal, and self-regulated learning; see Decius et al., 2023 or Kortsch et al., 2023) contribute to this.

## 6.2. Practical Implications

Our research findings have several practical implications for organizations.

For HR practitioners, our results first of all suggest that the provision of a variety of digital and non-digital learning offers for workplace learning seems a more promising approach than the provision of only a limited

range of learning offers, such as primarily digital learning offers or primarily classroom-based offers. This finding is specifically relevant against the background of increasing economic pressures (PwC, 2023). Reducing the variety of learning offers to, for example, only e-learning offers or reverting back to only offering class-room-based learning to reduce cost might be related to reduced need satisfaction at work.

Secondly, our results also imply that the provision of a variety of learning offers can only be the first step. The next step lies in adopting a learner-centered approach for human resource development, supporting learners in actually developing ExLO profiles that are related to high levels of basic need satisfaction at work. Based on our findings, this means that learners should be specifically encouraged to frequently engage in learning activities using different digital and non-digital learning offers. Our research thus provides evidence for guiding learners in their choice of learning offers and what to focus on in marketing learning offers to employees. This implication is specifically important in the face of the changing roles of learning and development professionals (Watkins & Marsick, 2023). As they begin acting in the role of learning consultants for the individual employees, it becomes increasingly important to move to a person-centered approach. The ExLOs presented in this article can serve as an empirically based starting point for one-on-one discussions with employees concerning their learning preferences and needs. These conversations might thereby also offer an additional venue for increasing desired outcomes such as work engagement, affective commitment, and lower turnover intentions (through improved need satisfaction (Marescaux et al., 2012)). As employees have come to expect a more personalized employee experience (Mahadevan & Schmitz, 2020) this approach might also improve their employee experience. In organizations in which the importance of learning is not yet fully recognized, HR practitioners can thirdly use the findings of this paper to support their arguments of the importance of learning in the workplace: profile 1 (versatile low frequency learners) showed the least correlations with need satisfaction whereas profile 4 (versatile high frequency learners) showed the highest mean values for the three basic need satisfaction facets as well as significant correlations with the satisfaction of all three basic need facets.

Since our results do not allow for conclusions about causality, another practical consideration needs to be taken into account: If need satisfaction could also influence learning frequency, practitioners should strive to support the development of organizational conditions that increase the likelihood of need satisfaction, such as possibilities to interact with others, and high levels of participation (see Hackman & Oldham, 1980).

### 6.3. Limitations

Despite careful study design and implementation, this study also has limitations. First, this study used an exploratory approach that can only provide initial indications of the relationships found. It should be noted that due to the cross-sectional study design, we can only say that the reported ExLOs and need satisfaction occur simultaneously, without making a statement about causality. Taking need for autonomy as an example, this means that future longitudinal studies could investigate whether low learning frequency leads to less autonomy being experienced in everyday work, or whether low autonomy leads to less learning, or whether low autonomy and low learning are due to common third-party variables such as the work environment.

Second, it is important to note that the data were collected in one organization from a specific sector (i.e., the transportation sector). This organizational setting may be accompanied by formal learning restrictions (e.g., restriction to e-learning offers from certain providers, mandatory trainings only available as a specific digital or non-digital learning offer) that limit the ability to take advantage of certain learning opportunities. For example, in the German transportation sector, there are high regulatory safety requirements for which safety training is mandatory and attendance must be demonstrated by the employer, so it is often classroom-based to actually ensure participation. It furthermore needs to be noted that in this sample, the versatile high frequency learners made up the largest group in the sample. In organizations with less focus on learning, this group might not be found to an equally large extent. Future studies should therefore validate the findings in other contexts with different specific requirements.

Lastly, we must note that although the survey was distributed organization-wide, participation was voluntary. Here, a self-selection effect may have occurred and people with a particular affinity for learning may have felt addressed. Even though a large variance was seen in the data here, future studies could overcome this limitation using experimental designs.

### 7. Conclusion

Work-related learning as part of an organization's talent development plays an important role in a digitalized world of work. With regard to the results of our study, we can state that different latent profiles of experiences with learning offers exist, which are composed of varying degrees of the three learning offers offline classroom-based learning, e-learning, and virtual classroom-based learning. This highlights the importance of using a person-centered approach in

human resource development to analyze learning offer use, not a static offer-centered approach. The six profiles we found are differentially related to the satisfaction of the three basic needs of competence, autonomy, and relatedness at work. Noticeably, the profile with a high and versatile level of learning had the strongest positive correlations with need satisfaction, while the profile with a low level of learning showed negative correlations. Further research on causality, underlying mechanisms, and boundary conditions is needed.

### 8. References

- Arthur, W., JR., Bennett, W., JR., Edens, P. S., & Bell, S. T. (2003). Effectiveness of training in organizations: A meta-analysis of design and evaluation features. *Journal of Applied Psychology, 88*(2), 234–245. <https://doi.org/10.1037/0021-9010.88.2.234>
- Beer, P., & Mulder, R. H. (2020). The effects of technological developments on work and their implications for continuous vocational education and training: A systematic review. *Frontiers in Psychology, 11*, 918. <https://doi.org/10.3389/fpsyg.2020.00918>
- Bell, B. S., Tannenbaum, S. I., Ford, J. K., Noe, R. A., & Kraiger, K. (2017). 100 years of training and development research: What we know and where we should go. *Journal of Applied Psychology, 102*(3), 305–323. <https://doi.org/10.1037/apl0000142>
- Bitkom Akademie, & HRPepper. (2020). *Weiterbildung 2025*. [Continuing education]. <https://www.bitkom-akademie.de/weiterbildung-2025>
- Cerasoli, C. P., Alliger, G. M., Donsbach, J. S., Mathieu, J. E., Tannenbaum, S. I., & Orvis, K. A. (2018). Antecedents and outcomes of informal learning behaviors: A meta-analysis. *Journal of Business and Psychology, 33*(2), 203–230. <https://doi.org/10.1007/s10869-017-9492-y>
- Chen, N.-S., Ko, H.-C. Kinshuk, & Lin, T. (2005). A model for synchronous learning using the Internet. *Innovations in Education and Teaching International, 42*(2), 181–194. <https://doi.org/10.1080/14703290500062599>
- Chou, C. C. (2002, January). A comparative content analysis of student interaction in synchronous and asynchronous learning networks. In *Proceedings of the 35th annual Hawaii international conference on system sciences* (pp. 1795-1803). IEEE.
- Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268. [https://doi.org/10.1207/S15327965PLI1104\\_01](https://doi.org/10.1207/S15327965PLI1104_01)
- Decius, J., Knapstein, M., & Klug, K. (2023). Which way of learning benefits your career? The role of different forms of work-related learning for different types of perceived employability. *European Journal of Work and Organizational Psychology*, Advance Online Publication. <https://doi.org/10.1080/1359432X.2023.2191846>



- Decius, J., Kortsch, T., Paulsen, H., & Schmitz, A. (2022). Learning What you Really, Really Want: Towards a Conceptual Framework of New Learning in the Digital Work Environment. *Proceedings of the 55th Annual Hawaii International Conference on System Sciences*, 5231–5240. <http://hdl.handle.net/10125/79975>
- Decius, J., Schaper, N. & Seifert, A. (2021). Work characteristics or workers' characteristics? An input-process-output perspective on informal workplace learning of blue-collar workers. *Vocations and Learning*, 14(2), 285-326. <https://doi.org/10.1007/s12186-021-09265-5>
- Dos Santos, L. M. (2022). Online learning after the COVID-19 pandemic: Learners' motivations. *Frontiers in Education*, 7, Article 879091, 879091. <https://doi.org/10.3389/educ.2022.879091>
- Ebner, C., & Gegenfurtner, A. (2019). Learning and Satisfaction in Webinar, Online, and Face-to-Face Instruction: A Meta-Analysis. *Frontiers in Education*, 4, Article 92, 92. <https://doi.org/10.3389/educ.2019.00092>
- Emerald Works. (2020). *Learner intelligence report: Addressing the disconnect between strategy and practice*. <https://mindtoolsbusiness.com/research-and-reports>
- Fontaine, G., Cossette, S., Maheu-Cadotte, M.-A., Mailhot, T., Deschênes, M.-F., Mathieu-Dupuis, G., Côté, J., Gagnon, M.-P., & Dubé, V. (2019). Efficacy of adaptive e-learning for health professionals and students: A systematic review and meta-analysis. *BMJ Open*, 9(8), e025252. <http://dx.doi.org/10.1136/bmjopen-2018-025252>
- Future learn (2022). *The future of learning report 2022*. <https://www.futurelearn.com/info/thefutureoflearning>.
- Gagné, M., Parker, S. K., Griffin, M. A., Dunlop, P. D., Knight, C., Klonek, F. E., & Parent-Rocheleau, X. (2022). Understanding and shaping the future of work with self-determination theory. *Nature Reviews Psychology*, 1(7), 378–392. <https://doi.org/10.1038/s44159-022-00056-w>
- Gartner (2019). *Reskilling the workforce: What works better- building continuous learners or building connected learners?* [www.gartner.com](http://www.gartner.com)
- Gegenfurtner, A., & Ebner, C. (2019). Webinars in higher education and professional training: A meta-analysis and systematic review of randomized controlled trials. *Educational Research Review*, 28, 100293. <https://doi.org/10.1016/j.edurev.2019.100293>
- Gegenfurtner, A., Schmidt-Hertha, B., & Lewis, P. (2020). Digital technologies in training and adult education. *International Journal of Training and Development*, 24(1), 1–4. <https://doi.org/10.1111/ijtd.12172>
- Hackman, J., & Oldham, G. R. (1980). *Work redesign*. Addison-Wesley.
- Hsu, H.-C. K., Wang, C. V., & Levesque-Bristol, C. (2019). Reexamining the Impact of Self-Determination Theory on Learning Outcomes in the Online Learning Environment. *Education and Information Technologies*, 24(3), 2159–2174. <https://doi.org/10.1007/s10639-019-09863-w>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55. <https://doi.org/10.1080/10705519909540118>
- Kashive, N., Powale, L., & Kashive, K. (2021). Understanding user perception toward artificial intelligence (AI) enabled e-learning. *The International Journal of Information and Learning Technology*, 38(1), 1–19. <https://doi.org/10.1108/IJILT-05-2020-0090>
- Kolade, O., & Owoseni, A. (2022). Employment 5.0: The work of the future and the future of work. *Technology in Society*, 71, 102086. <https://doi.org/10.1016/j.techsoc.2022.102086>
- Kortsch, T., Decius, J., & Paulsen, H. (2023). *Lernen in Unternehmen – formal, informell, selbstreguliert* [Learning in companies – formal, informal, self-regulated]. Praxis der Personalpsychologie, Band 43. Hogrefe.
- Kraiger, K., Ford, J. K., & Salas, E. (1993). Application of cognitive, skill-based, and affective theories of learning outcomes to new methods of training evaluation. *Journal of Applied Psychology*, 78(2), 311–328. <https://doi.org/10.1037/0021-9010.78.2.311>
- Mahadevan, J., & Schmitz, A. P. (2020). HRM as an ongoing struggle for legitimacy. *Baltic Journal of Management*, 15(4), 515–532. <https://doi.org/10.1108/BJM-10-2018-0368>
- Marescaux, E., De Winne, S., & Sels, L. (2012). HR practices and HRM outcomes: The role of basic need satisfaction. *Personnel Review*, 42(1), 4-27. <https://doi.org/10.1108/00483481311285200>
- Marjanovic, O. (1999). Learning and teaching in a synchronous collaborative environment. *Journal of Computer Assisted Learning*, 15(2), 129–138. <https://doi.org/10.1046/j.1365-2729.1999.152085.x>
- Mikołajczyk, K. (2022). Changes in the approach to employee development in organisations as a result of the COVID-19 pandemic. *European Journal of Training and Development*, 46(5/6), 544-562. <https://doi.org/10.1108/EJTD-12-2020-0171>
- Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education*, 14(2), 129–135. <https://doi.org/10.1016/j.iheduc.2010.10.001>
- Parker, S. K. (2017). Work Design Growth Model: How work characteristics promote learning and development. In J. E. Ellingson & R. A. Noe (Eds.), *Autonomous Learning in the Workplace* (pp. 137-161). Routledge. <https://doi.org/10.4324/9781315674131-8>
- PwC (2023). *26th Annual Global CEO Survey*. <https://www.pwc.com/gx/en/issues/c-suite-insights/ceo-survey-2023.html>
- Radoslaw, C. (2022). Webinar satisfaction factors in the stories of participants. *International Journal of Training and Development*, 26(3), 531-555. <https://doi.org/10.1111/ijtd.12275>
- Rigby, C. S., & Ryan, R. M. (2018). Self-Determination Theory in Human Resource Development: New Directions and Practical Considerations. *Advances in Developing Human Resources*, 20(2), 133–147. <https://doi.org/10.1177/1523422318756954>

- Schoop, S. (2023). Digitalization of Corporate Learning. In R. C. Geibel & S. Machavariani (Eds.), *Digital Management in Covid-19 Pandemic and Post-Pandemic Times* (pp. 147–157). Springer.
- Smet, K., Grosemans, I., De Cuyper, N., & Kyndt, E. (2022). Outcomes of Informal Work-Related Learning Behaviours: A Systematic Literature Review. *Scandinavian Journal of Work and Organizational Psychology*, 7(1), 1-18. <https://doi.org/10.16993/sjwop.151>
- Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and “how to” guide of its application within vocational behavior research. *Journal of Vocational Behavior*, 120, 103445. <https://doi.org/10.1016/j.jvb.2020.103445>
- Sørebø, Ø., Halvari, H., Gulli, V. F., & Kristiansen, R. (2009). The role of self-determination theory in explaining teachers’ motivation to continue to use e-learning technology. *Computers & Education*, 53(4), 1177–1187. <https://doi.org/10.1016/j.compedu.2009.06.001>
- Sousa, M. J., & Rocha, Á. (2019). Digital learning: Developing skills for digital transformation of organizations. *Future Generation Computer Systems*, 91, 327–334. <https://doi.org/10.1016/j.future.2018.08.048>
- Tynjälä, P. (2013). Toward a 3-P model of workplace learning: a literature review. *Vocations and learning*, 6(1), 11-36. <https://doi.org/10.1007/s12186-012-9091-z>
- Van den Broeck, A., Ferris, D. L., Chang, C.-H., & Rosen, C. C. (2016). A review of self-determination theory’s basic psychological needs at work. *Journal of Management*, 42(5), 1195–1229. <https://doi.org/10.1177/01492063166320>
- Van den Broeck, A., Vansteenkiste, M., Witte, H., Soenens, B., & Lens, W. (2010). Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the Work-related Basic Need Satisfaction scale. *Journal of Occupational & Organizational Psychology*, 83(4), 981–1002. <https://doi.org/10.1348/096317909X481382>
- Watkins, K. E., & Marsick, V. J. (2023). Rethinking Workplace Learning and Development Catalyzed by Complexity. *Human Resource Development Review*, 22(3), 333–344. <https://doi.org/10.1177/15344843231186629>
- Williams, A. (2020). Betting big on employee development. *MIT Sloan Management Review*, 61(3), 17-19.
- Wuppertaler Kreis (2022). *Trends in der Weiterbildung*. [Trends in Continuing Education]. <https://www.wkr-ev.de/>
- Žur, A., & Friedl, C. (2021). Transforming Workplace Learning: A Qualitative Inquiry into Adopting Massive Open Online Courses into Corporate Learning and Development. *Education Sciences*, 11(6), Article 295. <https://doi.org/10.3390/educsci11060295>