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No learning without autonomy? Moderators of the association between university instructors' learning goals and learning time in the teaching-related learning process

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1. Introduction

The professional development of university instructors is a prerequisite for student learning through high quality teaching (Biggs & Tang, 2011). However, recent research reviews have shown that it can be difficult to ensure that teaching professionals engage in and profit from learning at work (Kennedy, 2016). Models of self-regulated learning (Schmitz & Wiese, 2006; Zimmerman, 2000) suggest that motivation (which can be described by learners' goals) may be of central importance for the facilitation of this learning process. In line with this, research indicates that personal learning goals (i.e., the striving to expand one's competencies) are consistently associated with engagement in activities for professional development within teaching professionals (e.g., Diethert et al., 2015; Fritzsche & Daumiller, 2018; Nitsche et al., 2013). Nevertheless, studies investigating the professional development of university instructors and school teachers have primarily focused on direct relations between learning goals and learning behavior. To explain more complex associations such as the varying strength between learning goals and learning results (Payne et al., 2007), we aim to explore under which conditions learning goals

translate into learning behavior (moderation processes) and which mechanisms can explain the uncovered relationships (mediation processes). Based on self-regulated learning models (Schmitz & Wiese, 2006; Zimmerman, 2000), we propose that learning goals influence learning results via learning behavior (as indicated by learning time; see also Hein et al., 2019) under the condition that the individual has the necessary resources and is not limited by having too many job demands to engage in learning activities (e.g., higher autonomy, lower workload). To understand why we postulate these relationships, it is first necessary to elaborate further on the nature of the association between learning goals and learning behavior.

1.1. Learning goals as motivational prerequisites of learning time

Learning goals are a specific type of achievement goals, meaning that they are future-focused cognitive representations of competence-related results or end states (here: aspired competence development) that an individual is committed to either avoid or approach (Dweck & Leggett, 1988; Hulleman et al., 2010; Nicholls, 1984). Learning goals refer to an intrapersonal standard for evaluating own competence based

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on one's own development (Daumiller, Dickhäuser et al., 2019). A fundamental aspect for the differentiation of achievement goals constitutes the approach (striving to reach certain results or end states) and avoidance (striving to avoid certain results or end states) valence of goals (Elliot & McGregor, 2001). Previous research on university instructors' achievement goals further differentiate learning goals into *learning approach goals* (actively striving towards development and growth of own competences) and *learning avoidance goals* (striving to avoid not developing own competencies to the fullest extent; Daumiller, Dickhäuser et al., 2019). In a qualitative interview study, most university instructors spontaneously named self-related learning approach goals and a single university instructor also named learning avoidance goals as important aspects of their motivation at work (Daumiller et al., 2015). Consequently, learning approach and avoidance goals seem to be relevant for instructors' goal pursuit. According to its definition, learning approach goals should orient instructors' actions towards competence development, while learning avoidance goals might also promote a focus on the necessity of competence development.

The meta-analysis of Payne et al. (2007) highlighted the positive relationship between learning approach goals and adult learning results. In contrast, learning avoidance goals have rarely been investigated, as the natural occurrence of learning avoidance goals in achievement situations is controversially discussed (Cury et al., 2006; Hulleman et al., 2010). Nevertheless, this achievement goal class may be more prevalent in university instructors given that they are older than young students and might strive to a higher degree to avoid falling behind in their professional development (de Lange et al., 2010; Ebner et al., 2006). Adding to this, certain characteristics of this selective group, such as being highly educated and typically having gained professional knowledge and competencies in their studies prior to employment, also highlight the potential importance of this goal class for the context of university instructors' professional learning.

Consequently, we expect that learning avoidance goals may additionally be linked to learning gains as they too facilitate a personal focus on the necessity of competence development. Additionally, we see a substantial research gap regarding explanations on *how* learning (approach and avoidance) goals actually facilitate learning gains and *when* relationships between learning goals and learning gains emerge (Payne et al., 2007). In other words, it is important to identify mediators that explain the relationship and moderators that specify the consequences of learning goals. Once again, the models of self-regulated learning (Schmitz & Wiese, 2006; Zimmerman, 2000) can be highly instrumental in identifying such mediators and moderators.

1.2. Learning time as a mediator in the self-regulated learning process

According to the component model of self-regulated learning, learning behavior (e.g., learning quantity indicated by learning time) mediates the effects of motivation (e.g., learning goals) on learning results (Schmitz & Wiese, 2006). In this regard, learning goals might facilitate learning gains within higher education instructors through learning activities at the workplace. To be conceptually clear, in the current study, we consider the amount of time instructors actively engage in all learning activities (formal and informal) at work, in which university instructors acquire new competences for their work or improve existing ones as learning time (analogous to the definition of student learning time; Fisher et al., 1981). It is important to distinguish between learning time which is an indicator for the behavior of learning through engagement in learning activities, and possible learning results (e.g., increasing knowledge).

Prior research has indeed shown that learning approach goals are closely tied to learning behaviors in a variety of contexts (Hein et al., 2019; Choi & Jacobs, 2011; Diethert et al., 2015). Learning approach goals have been linked to the intended and actual use of competence-promoting further formal training as well as informal learning behaviors (Cerasoli et al., 2018; Diethert et al., 2015; Fritzsche & Daumiller,

2018). Moreover, learning approach goals are the only achievement goals that are consistently associated with engagement in learning activities in teaching professionals (e.g., Daumiller et al., 2020). To the best of our knowledge, only one study has found that the association between learning goals and learning time could explain the relationship between learning goals and learning gains (within a sample of 705 university instructors; Hein et al., 2019). However, the informative value of this research may be limited as the mediator and the outcome variables were assessed at the same time point, and learning time was assessed retrospectively under the condition of a long recall interval.

Moreover, the aforementioned study did not consider learning avoidance goals as a potential antecedent of learning time. We want to overcome this weakness by also investigating whether learning avoidance goals are linked to learning gains via learning behavior. This is theoretically plausible, as learning avoidance goals might also motivate university instructors to engage in learning activities, which can be instrumental for maintaining competence development.

1.3. Autonomy and workload as moderators in the self-regulated learning process

We posit that whether or not learning goals facilitate learning within university instructors may depend on job characteristics of their work in higher education. Specifically, autonomy in teaching might facilitate the learning process, while external pressure through work strain may be detrimental to it.

Regarding autonomy in teaching, we assume that motivation is more important for guiding learning behavior if individuals have the opportunity to freely decide how to conduct their teaching-related tasks and shape the teaching process. If this is not the case, it becomes more difficult to further develop and refine teaching procedures, and there may be less room for motivated action (Köller et al., 2001; Nitsche et al., 2013). The degree to which university instructors experience autonomy at work (freedom to choose between different options regarding one's goals and actions; Deci & Ryan, 2002) is subject to temporal change depending on deadlines and other restricting factors (Janke & Dickhäuser, 2018). The same is likely true for more specific autonomy in teaching. Fluctuations in autonomy in teaching can be expected to determine the degree to which university instructors are able to act on their learning goals. Under conditions of lower autonomy in teaching, the ability of university instructors to act on their learning goals should be reduced. As a result, we expect that perceived autonomy moderates the strength of the association between learning goals and learning time in the teaching-related learning process.

While we consider autonomy in teaching as a domain-specific moderator for the association between learning goals and learning time, we consider general workload as a moderator on a more general work-related level. Due to the multiple demands of different work tasks including teaching, research, and administration (Esdar et al., 2016), as well as time pressures stemming from deadlines (Janke & Dickhäuser, 2018), university instructors might also experience a conflict of resources when it comes to distributing their time across work domains. Thus, when the demands of research and administration are high, this could limit their ability to invest time into learning in teaching. In line with the component model of self-regulated learning (Schmitz & Wiese, 2006), we assume that university instructors have less leeway to pursue their own learning goals under such conditions of more experienced workload. Consequently, learning goals should have a weaker effect on learning time when university instructors experience higher workloads.

1.4. Present research

In the following study, we aim to investigate the relationships between university instructors' learning goals and their learning gains in the teaching domain. Thereby, we postulated that both learning approach and learning avoidance goals are positively associated with

learning gains. Furthermore, we wanted to shed light on the question of *how* and *when* learning (approach and avoidance) goals facilitate effects on learning gains. More specifically, we aimed to replicate learning time (as proxy for learning behavior) as a mediator of the positive association between learning approach goals and learning gains (first shown by Hein et al., 2019), while also providing preliminary evidence that learning avoidance goals are positively linked to learning gains through learning time. For this purpose, we used a longitudinal correlational design to qualify temporal ordering and address methodological limitations of prior research. Furthermore, we propose perceived autonomy in teaching and subjective workload as possible moderators in the learning process that explain *when* learning (approach and avoidance) goals predict the time invested in teaching-related learning activities at work. We expected that perceived autonomy in teaching would enhance the association between learning (approach and avoidance) goals with learning time, whereas subjective workload would weaken this relationship. Furthermore, autonomy in teaching and workload could also be antecedents of learning behavior at work (e.g., de Groot et al., 2012). Thus, we also explored direct associations of autonomy in teaching and workload with this variable.

2. Material and methods

2.1. Sample

We conducted a micro-longitudinal study including 107 instructors employed at two universities in Germany (49% female, age: 40.85 years on average, $Min = 23$, $Max = 66$, $SD = 10.62$ years) over the time span of five weeks. All of them had at least one course in the semester of participation. The participants had an average of 9.49 years of teaching experience ($Min = 0$, $Max = 30$, $SD = 7.88$) and reported working an average of 17.05 h per week on all teaching activities including the time spent teaching, the preparation, and the follow-up work after their courses ($Min = 3$, $Max = 54$, $SD = 10.38$). They were employed in a wide array of disciplines. Most participants worked in the social sciences (31.6%), followed by educational sciences (19.3%), as well as the humanities (12%). Furthermore, minor groups of participants were working in the natural sciences (5.5%) as well as in law (3.7%). The other participants omitted information concerning their discipline (27.1%). The sample consisted of doctoral candidates (37.4%), post-docs (32.7%) and full professors (19.4%); 13.1% did not report their academic status. It is important to note that doctoral candidates are predominantly members of the academic staff (and not students) at German universities, and therefore take on tasks in research, teaching, and administration in the same way as other university instructors.

2.2. Procedure

This study was conducted at two medium-sized public universities in Germany (with around 10,000 to 20,000 students) in the years 2017/2018. We invited instructors of both universities through university-wide advertisements (i.e., flyer) as well as through direct inquiries via mail. Overall, 120 university instructors registered for study participation (response rate around 5%¹), 107 instructors participated in at least one of the time points (participation rate: 89%). The participation in this study was voluntary for all instructors. The participants received an additional teaching evaluation in the mid of the semester with weekly student feedback and a book on didactic methods in higher education as incentives. We assured the participants that their answers would remain confidential and would only be used for scientific

purposes.²

The study consisted of two parts: First, the participants answered a baseline questionnaire one week before the semester started. Additionally, the participants answered a short questionnaire weekly over the first five weeks of the semester (in total, 477 weekly measurement occasions, $M = 4.46$ weekly measurements per participant, $SD = 0.93$). The baseline questionnaire included questions concerning demographics, the predictor variables (teaching-related learning approach and learning avoidance goals) as well as perceived autonomy in teaching. Regarding the weekly measures, participants reported the time they spent engaging in teaching-related learning activities as well as their perceived workload within the last week during the first four measuring points. In the fifth week, participants rated their perceived teaching-related learning gains within the last five weeks. Participants answered the paper-pencil questionnaires at the same time every week.^{3,4} The weekly paper-pencil questionnaires were delivered in person by the study authors and research assistants. The weekly measurement of learning time was implemented to limit bias through a long recall interval and achieve a more reliable measure of invested learning time, as this information should be more easily accessible on weekly bases.

2.3. Instruments

One important difference between the baseline questionnaire (learning goals in teaching, autonomy in teaching) and the weekly assessments (learning time in teaching, subjective workload at work) was that we used short scales with a low number of items for the latter because this is the best way to capture current experiences (see also Goetz et al., 2016). For internal consistencies, we reported McDonalds' Omega (Green & Yang, 2015) for all scales that consisted of more than two items. We used the Spearman-Brown coefficient to assess reliability for the scales of the weekly questionnaire, if the scale or subscale consisted of two items only (as recommended by Eisinga et al., 2013).

2.3.1. Learning goals in teaching

To assess university instructors' current learning goals in teaching, we used a well-validated questionnaire (Daumiller, Dickhäuser et al., 2019). We assessed university scholars' learning goals with regard to their current teaching activities using the item stem "*In my current teaching activities...*". The scales assessing learning approach and avoidance goals were based on four items each (e.g., learning approach goals: "...I want to constantly improve my competences", and learning avoidance goals: "...it is important to me to avoid having my competences not develop further", see Electronic Supplement A for item wording). All items were answered on Likert-type scales ranging from 1 (*do not agree at all*) to 8 (*agree completely*). The internal consistencies were $\omega = 0.93$ for learning approach goals and $\omega = 0.85$ for learning avoidance goals. We used the average score across the four items as an indicator for

² The study was conducted in full accordance with Ethical Guidelines of the German Association of Psychologies (DGPs) and the American Psychological Association (APA). At the time the data was acquired, it was neither customary at the respective university, nor at most other German universities, to seek ethics approval for survey studies on motivation and self-ascribed learning. The study exclusively makes use of anonymous questionnaires. We had no reasons to assume that our survey would induce any negative states in the participants.

³ This study used the data of a larger micro-longitudinal study (Daumiller, Hein et al., 2019), in which we also assessed further constructs. Here, we report only on the aspects of the study that are relevant for our specific hypotheses and analyses. There is no overlap in sample or measures compared to previously published studies.

⁴ University instructors could participate with more than one course. However, because we were not interested in aspects of specific courses, we randomly selected the data of one course per instructor for our analyses when the participants had participated with more than one course.

¹ The response rate is only a conservative approximation, as it entails the number of individuals willing to participate in the study in relation to all employed instructors at both universities at the time the study was conducted. It is not clear if all instructors had been reached by the advertisement measures.

learning approach and learning avoidance goals.

2.3.2. Perceived autonomy in teaching

The scale measuring perceived autonomy in teaching was based on a German version of the balanced measure of psychological needs (Sheldon & Schöler, 2011) and captures the teaching-related autonomy which instructors generally experience in teaching. The six-item scale contained three positively and three negatively worded items (the latter items were recoded when calculating the average teaching-related autonomy score across the items). The wording of the items was slightly adapted to refer more closely to the teaching context of the university instructors. Therefore, we added an item stem (“*In my teaching...*”) and changed item wording into present tense (sample item: “*In my teaching... I am free to do things my way.*”). All items were answered on Likert-type scales ranging from 1 (*do not agree at all*) to 8 (*agree completely*). The internal consistency was $\omega = 0.72$.

2.3.3. Subjective workload

We used two adapted items of the work overload subscale of a validated German questionnaire (Schulz et al., 2004) to measure subjective workload. University instructors were asked to report how often they experienced different signs of work overload within the last week. The scale consisted of two items (items: “*Times when I have too many obligations to fulfill*”, “*Times when my work is over my head*”; $\rho = 0.73$ – 0.82 within the four measurement points). All items were measured with a Likert-type scale ranging from 1 (*never*) to 8 (*very often*). The average scores across both items per week correlated highly between the four measurement points ($r = 0.60$ – 0.90 , $p < .001$). As an indicator for subjective workload, we used the average score of the two items across the four measurement occasions.

2.3.4. Learning time in teaching

To measure learning time, we assessed the time that instructors invested in learning activities on a weekly basis. We adapted a validated instrument to assess this weekly learning time for teaching (Daumiller, 2018). Since learning activities in teaching can be directed to enhance professional competencies for the next class or methodological-didactical competencies in teaching, we asked for the weekly learning times concerning both competence domains separately to ensure that participants think about and include both relevant content aspects of the construct. University instructors reported how many hours they had invested in learning time within the past week using two open format questions (namely: “*How much time did you spend last week to expand your professional/methodological competence in the field of teaching?*”). For clarification, we included examples of professional competences (e.g., *expert knowledge, knowledge about scholarly debates*) and methodological-didactical competences (e.g., *effective planning of seminars, appropriate teaching methods*) in the question. The sums of learning times per week correlated highly between the four weeks ($r = 0.48$ – 0.92 , $p < .001$). As an indicator for learning time, we summed the two reported learning times per week and calculated the average score across the four weeks. Thus, our indicator represents the average weekly learning time in hours.

2.3.5. Learning gains in teaching

In order to measure the learning result for the teaching contexts, we adapted a validated scale (Daumiller, 2018). We asked the participants to what extent they had enhanced their professional competence (e.g., “*To what extent have you enhanced your professional competence for teaching?*”) and methodological competence (e.g., “*To what extent have you increased your didactical-methodological knowledge for teaching?*”) in the last five weeks at the fifth weekly measurement occasion. The scale consisted of four items in total with two items per domain (professional and methodological competence). The items were answered on Likert-type scales ranging from 1 (*not at all*) to 8 (*extensively*). The internal consistency was $\omega = 0.87$. We used the mean value across the four

items as a measure for learning gains.

2.4. Analyses

We conducted structural equation models with manifest scores using Mplus Version 7 (Muthén & Muthén, 1998–2012) to investigate our research questions. Before the analyses, we excluded outliers for the open-ended measures of learning time. According to Osborne and Overbay (2004), regression results are sensitive to outliers and correlations are more accurate if outliers are removed. Four participants were excluded due to their reported average learning time being outside of a 99% CI (Cut off point: $Z = |2.68|$). All four excluded participants reported extremely high average learning times (above 40 h per week). In addition, we excluded one participant that had missing values on all model relevant variables. This resulted in a sample size of $N = 102$ for the analyses.⁵

Furthermore, we verified whether the data and model met the requirements for structural equation modelling. In order to determine whether the given sample size was appropriate for manifest structural equation modelling of single moderation and mediation models with three variables each (predictor, mediator/moderator and outcome); we calculated a ratio of the estimated parameters to the sample size of 1:10 as recommended by Bentler and Chou (1987). The distribution of data violated the assumptions of normal distribution in Kolmogorov-Smirnov tests for most variables (learning approach and avoidance goals, invested learning time, and subjective workload) and consequently, the assumptions of multivariate normality. Therefore, we used a maximum likelihood estimator with robust standard errors (MLR), which is robust to non-normality.

A handful of participants did not answer the baseline questionnaire before the semester started (8.2%). Additionally, 1% of participants did not provide information regarding learning avoidance goals (with a maximum of 2% missing data on the item level). There was no additional missing data for learning approach goals or perceived autonomy in teaching. On the construct level, no data was missing for learning time and subjective workload, but 19.5% of the data was missing for the learning gains construct, as this construct was only measured once in the fifth weekly questionnaire. We used a Full Information Maximum Likelihood approach (FIML) to include all available information for model estimations, which increases the power of the data analysis and reduces the impact of bias due to missing data (Enders, 2010).

2.4.1. Mediation analyses

We estimated separate manifest structural equation models for the mediation and moderation hypotheses. In the base models, we tested whether the relationship between learning goals and learning gains was mediated via learning time (indirect effect). We tested this mediation for learning approach and learning avoidance goals separately (resulting in two mediation models). Both mediation models were fully saturated.

2.4.2. Moderation analyses

In the subsequent models, we examined whether perceived autonomy in teaching or subjective workload moderated the relationship between learning goals and learning time. These models were also calculated for learning approach and learning avoidance goals as well as for both moderators separately (resulting in four moderation models). In all moderation analyses, we used linear interaction terms to

⁵ We also conducted analyses with the full sample before outliers were removed to investigate the robustness of our results. Descriptive results, bivariate correlations and mediation analyses were mostly robust. However, some of the moderation effects changed slightly, which should not be overinterpreted given the nature of the outliers representing very unrealistic time spans. See Electronic Supplement B for the results of the additional analyses.

Table 1

Descriptive statistics and correlations between university instructors' learning approach and avoidance goals, learning time, self-reported learning gains, perceived autonomy, and subjective workload.

	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>Skew</i>	<i>N</i>	[1]	[2]	[3]	[4]	[5]
[1] Learning approach goals (T0)	2.50	8.00	6.61	1.42	-1.12	92					
[2] Learning avoidance goals (T0)	1.00	8.00	5.85	1.68	-0.72	91	0.58 < .001				
[3] Learning time (T1-4)	0.00	39.75	6.44	6.82	2.28	100	0.03 .708	0.27 < .001			
[4] Learning gains (T5)	1.00	8.00	4.38	1.64	-0.01	84	0.25 .020	0.46 < .001	0.37 < .001		
[5] Perceived autonomy (T0)	2.50	7.67	6.01	0.99	-0.71	92	0.12 .376	0.03 .726	0.16 .096	0.12 .314	
[6] Subjective workload (T1-4)	1.00	8.00	5.10	1.86	-0.54	102	-0.20 .017	-0.17 .052	0.00 .976	-0.16 .099	-0.19 .053

Notes. *Min* = Minimal; *Max* = Maximum; *M* = Mean; *SD* = Standard deviation; T0 = Measurement in the baseline questionnaire; T1-4 = Measurement in the first four weeks of the semester; T5 = Measurement in the fifth week of the semester. Significant correlations are printed in boldface and levels of significance are reported under the correlations ($N = 102$). The reported characteristics of situational measures have been aggregated over the weekly measures as indicated by T1-4. The theoretical range of all constructs except for learning time was $Min = 1$ to $Max = 8$. The zero-order correlations are derived from a saturated base model in which undirected paths between all variables were freed.

indicate the interaction between learning goals and moderators (after grand mean centering both variables). We then regressed learning time on the respective goal, the moderator, and the linear interaction term. We allowed for correlations between the predictors in the moderation models, as correlations between learning approach (or avoidance) goals and the moderators (perceived autonomy in teaching or subjective workload), as well as the interactions, are theoretically reasonable. All moderation models were fully saturated.

3. Results

The descriptive statistics and the correlations of all variables are reported in Table 1.⁶ While learning approach goals at the baseline measure only correlated positively with later self-reported learning gains, learning avoidance goals were positively associated with later invested learning time and self-reported learning gains.

3.1. Learning time as mediator in the learning process

Standardized path coefficients of the mediation models for learning approach and avoidance goals are depicted in Fig. 1.

3.1.1. Mediation model for learning approach goals

As expected, learning approach goals and learning time were positively associated with later self-reported learning gains in teaching. However, learning approach goals were not a statistically significant predictor of the invested learning time in the first four weeks of the semester. The positive association of learning approach goals and self-reported learning gains in teaching (total effect: $\beta = 0.29$, $SE = 0.10$, $p = .002$) was not mediated by learning time (indirect effect: $\beta = 0.01$, $SE = 0.03$, $p = .366$, 90% CI [-0.04, 0.06]). The mediation model explained 19% of the variance in self-reported learning gains ($p < .05$), but did not explain variance in the invested learning time.

⁶ In our sample, a multifactorial ANOVA for all model relevant variables was conducted to ensure comparability of the three subgroups (doctoral students, post-docs, full professors). Overall, the three groups revealed no significant differences (Wilks $\lambda = 0.77$; $F(12,132) = 1.51$; $p = .126$). See Electronic Supplement C for the sub group specific descriptive statistics. In addition, we explored whether the association of learning goals and learning time vary between the three groups and regarding the differences in teaching commitments. No additional moderation analyses reached levels of significance (see Electronic Supplement D for the results). All three groups seem comparable regarding the analysed constructs and the link between learning goals and learning time.

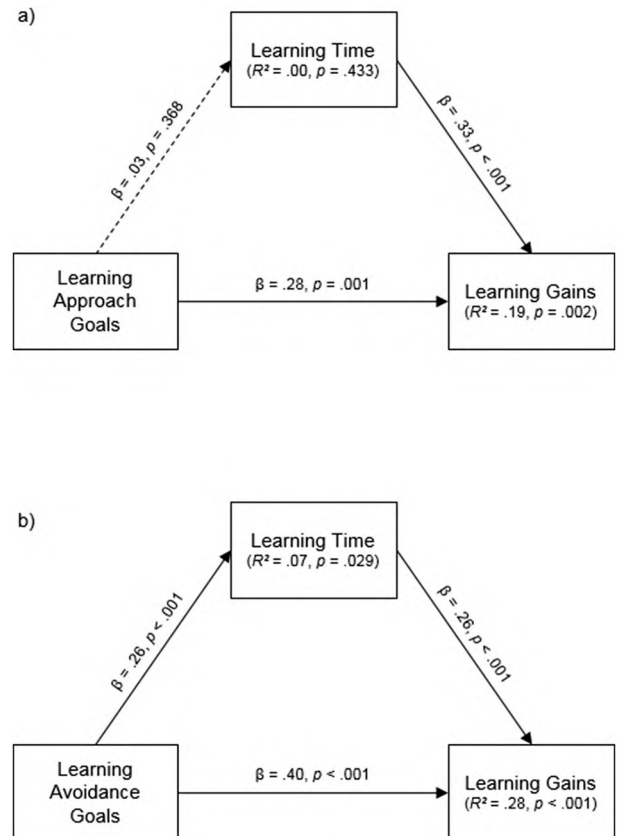


Fig. 1. Results of the structural equation models for the mediation effects of a) learning approach goals and b) learning avoidance goals.

3.1.2. Mediation model for learning avoidance goals

Learning avoidance goals were positively associated with learning time and self-reported learning gains in teaching. As expected, learning time was a statistically significant mediator of the positive association between learning avoidance goals and self-reported learning gains (total effect: $\beta = 0.47$, $SE = 0.09$, $p < .001$; indirect effect: $\beta = 0.07$, $p = .009$, $SE = 0.03$, 90% CI [0.02, 0.11]). The mediation model with learning avoidance goals explained 7% of the variance in the average invested learning time per week ($p < .05$) and a substantial amount of variance 28% in self-reported learning gains ($p < .001$).

Table 2

Results of the moderation effects of university instructors' learning approach and avoidance goals with perceived autonomy or subjective workload on learning time.

	Model 1			Model 2			Model 3			Model 4		
R^2	$R^2 = 0.04, p = .164$			$R^2 = 0.01, p = .300$			$R^2 = 0.12, p = .034$			$R^2 = 0.08, p = .051$		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p
Learning approach goals	0.04	0.10	.357	−0.01	0.10	.456						
Learning avoidance goals							0.18	0.07	.007	0.24	0.08	.001
Perceived autonomy	0.17	0.10	.084				0.19	0.10	.069			
Subjective workload				−0.04	0.15	.809				−0.01	0.13	.969
Interaction	0.11	0.07	.072	0.13	0.12	.142	0.19	0.10	.025	0.13	0.09	.070

Notes. β = standardized regression coefficient; SE = standard error; p = one-tailed level of significance (however, two-tailed levels are reported for direct exploratory effects of autonomy and workload). The reported interaction effect always describes the interaction of the predictor variables that are contained in the model. Significant effects ($p < .05$) are printed in boldface. In the moderation models, we allowed for correlations between predictor variables, which varied between −0.24 and 0.12 in Model 1, −0.20 and 0.29 in Model 2, −0.17 and 0.37 in Model 3, −0.18 and 0.40 in Model 4.

3.2. Perceived autonomy in teaching and subjective workload as possible moderators

The strength of perceived autonomy in teaching did not explain the strength of the positive association between learning approach goals and the invested learning time (see Table 2). Nevertheless, the interaction effect of perceived autonomy in teaching and learning approach goals pointed descriptively in the expected direction. A statistically significant moderation effect of perceived autonomy in teaching was found for the positive association between learning avoidance goals and invested learning time in the expected direction. In other words, the higher the perceived autonomy in teaching, the stronger the positive link between learning avoidance goals and invested learning time (see Fig. 2). In contrast to our expectation that the strength of subjective workload should weaken the positive association between learning approach/avoidance goals and learning time, we did not find a statistically significant interaction effect of subjective workload and learning approach or avoidance goals on invested learning time. Moreover, we did not find statistically significant direct associations of the moderators with learning time.

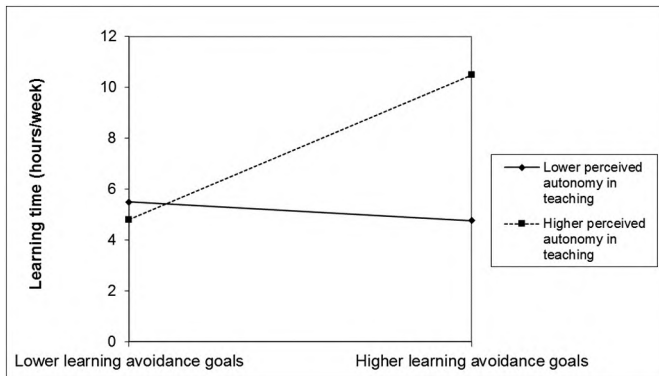


Fig. 2. Simple slope plot as a visualization of the interaction effect of learning avoidance goals and perceived autonomy in teaching. Note: The plot reflects the association for individuals 1 SD below ($M = 5.02$) and above ($M = 7.00$) the average perceived teaching-related autonomy score to illustrate the nature of the linear interaction term. Compared to the scales midpoint, the depicted individuals still reported rather high autonomy scores.

4. Discussion

In the present micro-longitudinal study, we investigated how and when learning approach and learning avoidance goals predict university instructors' learning behavior (indicated by weekly learning time) and its results (indicated by self-reported learning gains). Our

study advances research on the impact of learning goals from a methodological perspective, as we used situated measures for learning time and a research design that allowed for prospective analyses through the temporal ordering of the variables (learning goals, learning time, and learning gains). In contrast, prior research often measured learning time retrospectively alongside predictor variables or criteria (Hein et al., 2019; Fritzsche & Daumiller, 2018), which might have led to an overestimation of the effects. In our study, we found that both learning approach and learning avoidance goals explained substantial amounts of variance in self-reported learning gains, which was in line with our assumptions and prior research on learning approach goals (Hein et al., 2019; Payne et al., 2007). We also tried to replicate learning time as a mediator of the positive association between learning approach goals and learning results in the self-regulated learning process. We found this mediation effect for learning avoidance goals but surprisingly, not for learning approach goals, which would have been in line with prior research on the subject matter (Hein et al., 2019). Furthermore, we investigated whether learning goals translate into learning time to a higher degree under the conditions of lower workload at work and higher autonomy in teaching. However, it was only found that perceived autonomy in teaching had a statistically significant effect in that the positive association between learning avoidance goals and invested learning time was strengthened. More specifically, the higher university instructors perceived their autonomy in teaching to be, the stronger was the association between learning avoidance goals and the time invested in learning. Although the moderation effect of perceived autonomy in teaching did not statistically significantly moderate the link of learning approach goals and invested learning time, the regression coefficient indicated the expected positive direction. We did not obtain any of the expected moderation effects for workload.

Our research highlights the close connection between learning goals and learning gains. Consistent with prior research, we found that learning approach goals facilitate learning gains. Nevertheless, we did not find that this association was partly due to impact of learning approach goals on learning behavior (here: invested learning time), which would have been in line with prior research on university instructors' learning goals (Hein et al., 2019). One possible explanation for this missing association may be that we assessed learning time with a situated measure in the limited time span of the four weeks at the beginning of the semester instead of additionally including a time span within the term break. During the semester, university instructors might feel pressured to invest most of their resources into facilitating a learning climate in their new courses and carrying out proper teaching, which should translate to increased workload in the teaching domain (as indicated by the high mean regarding workload in our study). In turn, this could imply that the investigated period was not optimal for uncovering effects of learning approach goals on invested learning time. Learning approach goals might be more relevant for guiding learning behavior during the lecture free time, which may explain

inconsistencies with results from prior studies. The period of assessment (e.g., within the semester or term break) should be considered in further research as a variable that might influence instructors' motivation and the impact it has on the learning process. Finding such effects could provide important knowledge about the role that contextual variables have in influencing the impact of university instructors' learning goals.

Additionally, this could also explain why learning avoidance goals were more closely associated with invested learning time and self-reported learning gains than learning approach goals in our sample. University instructors with strong learning avoidance goals may be especially pressured by the fear of missing out on potential learning opportunities in times of pressure, which could translate into compensatory actions (such as engaging in learning activities). Strong learning avoidance goals might also buffer the expected moderating effect of workload, while learning approach goals would not lead to compensating actions in times of pressure. Overall, our study provides critical insight into the importance of learning avoidance goals for the learning process. Previous studies often neglected learning avoidance goals as a potential predictive achievement goal class. In contrast, we found that invested learning time mediated the positive association between learning avoidance goals and self-reported learning gains. Thus, in our sample, learning avoidance goals were found to be an important indication that weekly learning time at work can be motivated through the need to maintain competence development. Our results underline the relevance of learning avoidance goals for the population of university instructors (e.g., Daumiller et al., 2016; Daumiller, Dickhäuser et al., 2019).

While we did not find the association between learning goals and invested learning time to be moderated by workload, we did find a moderation effect between perceived autonomy in teaching and learning avoidance goals. Furthermore, we argue that autonomy might be more crucial in other working contexts, since our research suggests that university instructors tend to work under conditions of rather high autonomy (as expressed by the rather high means regarding perceived autonomy in teaching). It is plausible that perceived autonomy has stronger effects on the association between learning goals and learning times in working contexts that are characterized by higher external pressures.

4.1. Practical and theoretical implications

Given that it is difficult to ensure that teaching professionals engage in learning at work (Kennedy, 2016), research that sheds light on antecedents can provide relevant practical implications. To this end, our study looked into learning goals as antecedents of learning behavior. Learning (avoidance) goals might be considered as a relevant concept in the development of further trainings and future interventional studies with university instructors. Moreover, our findings concerning a positive association between learning time and later self-reported learning gains indicate that university instructors may benefit from frequently participating in learning activities in teaching. Moreover, as perceived autonomy in teaching strengthened the positive association between learning avoidance goals and invested learning times, it might be useful to maintain and foster university instructors' teaching-related autonomy (e.g., self-determined time management, choice of course topic, or methods of instruction).

Our empirical findings support some assumptions of the theories in which our hypotheses were grounded. In regard to models of self-regulated learning, motivation (in form of learning approach and avoidance goals) was associated with the learning results (later self-reported learning gains). Furthermore, the quantitative learning behavior (learning time) mediated the association of motivation (only in form of learning avoidance goals) and learning results (later self-reported learning gains). However, it is too early to interpret these findings as a definite proof for the postulated mechanism as learning time and learning gains have been assessed by self-report measures and

the mediation effect of learning approach goals was not replicated within this study.

4.2. Limitations and future directions

Despite the strengths of the present study, some limitations need to be considered. Firstly, the complexity of our research design limited our research to a select set of two universities and required a strong commitment from the participating instructors, resulting in a low response rate and a restricted sample size. Consequently, our sample does not constitute a representative sample. Our results might be influenced by characteristics of the work environment at the set of universities. It is of high interest to take contextual variables of universities into account to gain a deeper understanding of the influence on the learning process in future studies. Furthermore, we cannot rule out self-selection bias as we might have only reached university instructors who were highly motivated regarding teaching (as indicated by high means in learning goals in our sample). The teaching-related incentives might have strengthened a self-selection bias in our sample. This restriction of range in the predictor variable (learning goals in teaching) might have led to an underestimation of the population effect size in our sample of university instructors (Sackett & Yang, 2000). Thus, we see the presented results as a potentially conservative estimation of the underlying relationships. In addition, the impaired power due to the small sample size weakened our ability to detect smaller effects which might be important. Thus, it remains important that future research aims to replicate our findings in a wider range of contexts to facilitate the necessary power to investigate both small effects and potential contextual moderators.

While we have advanced the operationalization of learning time, we believe that the operationalization of learning results could still be improved. Due to restrictions in design (multiple universities and different departments), it was not possible to include an objective measurement of learning results that would have been valid for all participants. Therefore, a subjective self-report scale was used to measure the learning gains of university instructors, which only represents an approximation of actual learning gains. Thus, associations with this variable also resemble approximations rather than exact estimates. This approximation can serve as a starting point for future research on this relationship. Nevertheless, the robustness of the relationship between learning goals and learning gains (Payne et al., 2007) makes us confident that similar results would emerge when applying different measures of learning effectiveness.

It is important to note that our study with university instructors did not experimentally manipulate learning goals, learning time, or moderator variables. Therefore, our results cannot be interpreted as causal proof, but might represent temporal trends. For this reason, further (experimental) studies on the population of university instructors are important to advance our understanding of the causal impact of learning goal, learning time, or autonomy centered interventions.

A further limitation constitutes that all constructs were measured with the same method, more precisely, self-report-scales. While our longitudinal approach may weaken assimilation effects and, thus, single source bias (Podsakoff et al., 2003), we cannot rule out the influence of such a bias completely. Thus, future research needs to rely on multiple measurement methods more strongly, including objective measures of learning time and learning gains to further advance our understanding of the associations that we have presented.

Finally, models of self-regulated learning allow for further speculation on how individual differences in observed variables might affect the observed associations between learning goals and learning gains. For instance, it is possible that goal commitment further mediates the association between learning goals and learning gains (Klein & Lee, 2006). In addition personality traits such as conscientiousness, which enable individuals to commit to their initial goal even in times of high distress, might be considered as an additional predictor of learning behavior and learning gains (Klein & Lee, 2006). Learning goals may

also facilitate effects on learning gains through variables aside from learning time, such as the choice of high quality learning strategies (see Elliot et al., 1999). After all, learning gains are determined by multiple variables (e.g., quantitative learning, self-monitoring, quality of learning, and volitional strategies) rather than single variables. This assumption is supported by models of self-regulated learning. Furthermore, the amount of variance in learning gains that was not explained within our study may be interpreted as a hint that learning gains are caused by multiple predictor and process variables. Some of these variables might be prone to influences of personal goals, while others are influenced by other factors. We consider our research as a first step towards a more distinguished understanding of self-regulated learning of university instructors. Future studies should supplement this line of research by examining additional mediators and moderators of the association between learning goals and learning gains, as well as antecedents beyond learning goals. Such investigations could also allow for deeper insights through the use of multi-faceted measures for learning behavior that are not limited to learning time.

5. Conclusion

The present study provides new insights into the associations between university instructors' learning (approach and avoidance) goals with learning gains. Our results support three notions: First, learning approach and avoidance goals are associated with later reported learning gains. Second, learning time at least partly mediates the association between learning avoidance goals and learning gains. Third, perceived autonomy in teaching facilitates the association between learning avoidance goals and invested learning time, and in turn, the professional development of university instructors. In sum, continuing research into the mechanisms behind the association of learning approach and especially learning avoidance goals with learning gains is a worthwhile endeavor. Understanding the impact of professional motivation of higher education instructors and relevant constraints is crucial in fostering learning behavior (indicated by learning time) and its results in higher education.

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Appendix A to D. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.lindif.2020.101937>.

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