Investigating Vocational Teachers' Informal Workplace Learning Using Experience Sampling

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Article Outline

Acknowledgement

We would like to express our gratitude to Miss Julia Banschbach for the invaluable work in her masters' thesis. The created learning outcome framework based on the literature as well as her qualitative data analysis served as a basis for answering the second research question in this paper.

Possible Journals

Teaching and Teacher Education (IF: 4.0),
https://doi.org/10.1016/S0742-051X(02)00101-4 was also published here

Regelungen/Hinweise:

- Abstract: 100 words, 3 - 6 keywords
- Report: 5.000-9.000 words

Ansonsten:

- Human Resource Development International (IF: 3.8)
  - https://doi.org/10.1080/13678860010004123 was also published here
- Journal of Workplace Learning (IF:)
- Vocations and Learning (IF: 1.9)
- Learning Environments Research (IF: 2.7)
- Technology, Knowledge and Learning (IF: 3.0) - not that fitting…
- Empirical Research in Vocational Education and Training (IF: 1.6)
- Learning and Instruction (IF: 4.7) - not that fitting…

Abstract

...

Keywords: workplace learning, teacher training, informal learning, experience sampling, multilevel modelling

1 Introduction

According to Rausch (2014), …

- teacher shortage and difficult working conditions of teachers
  - stress, coping are important
  - learning of teachers has a particular important role
    - teachers have to prepare their lessons and
    - furthermore, teachers need to stay up to date
    - The teaching profession has a particular set of characteristics and job demands. At the same time, teachers are provided with a high degree of freedom or job decision latitude. –> Karasek: learning hypothesis
  - vocational schools are under-represented in studies (). while there is research tackling other schools, still very little research on vocational schools.
- lack of research on teachers at vocational schools ()
  - experience sampling

Thus, the following research questions will be tackled in this paper:

1. RQ (Stress, coping and learning across activities, control for age, sex, jobscope + data from the FBS) - MLM

   Which of teachers' daily work activities are perceived as (a) the most stressful and (b) with which of the stressful activities could the teachers cope the best? (c) Which of teachers' daily activities are perceived as the most conducive to learning?

2. [Desription of the Learning (freetext fields, qualitative analysis)]

3. RQ (Karasek, control for age, sex, jobscope + data from the FBS) - MLM

   Do stress and coping predict informal learning in teachers' daily work activities, as stated in Karasek's learning hypothesis?

   H: according to Karasek

include a participation effect (control for a bias) H: higher participation -> bigger pc_learn Can time effects be found in the data? Does continued experience sampling have an effect on perceived informal learning?

2 Research on Teachers' Workplace Learning

2.1 Characteristics of the Teaching Profession and Vocational Teachers' Daily Work Activities

2.1.1 Characteristics

- High degree of freedom in the profession
- subject (especially in vocational schools).
  - –> high demand to learn

- Needed: Alternative to Rothland (2013)???
  - Multiple sources that describe the characteristics
- teacher stressors and coping (briefly): outline from research on teacher stress
  - –> Lazarus & Folkman (for Stress)

2.1.2 Teachers' Daily Work Activities

- Overview teachers' work activities (framework from the literature)

2.2 Workplace Learning and Vocational Teachers' Learning Activities

- formal, non-formal vs. informal WPL (so far from bwpat!!!)

In workplace learning, researchers typically differentiate between formal, non-formal and informal learning (e.g., Coombs & Ahmed, 1974; Imants & van Veen, 2010). Formal learning is typically defined as structured learning in pedagogical settings such as university teacher training. In these settings, learning occurs intentionally and is planned (Marsick & Watkins, 2015; UNESCO Institute for Statistics, 2012). Non-formal learning is "institutionalized, intentional and planned" as well (UNESCO Institute for Statistics, 2012, p. 11) but in contrast to formal learning, it is not part of the national qualifications framework but includes training and development in companies (Bilger et al., 2013, p. 20) such as information resources for further teacher training. In contrast, informal learning is unintentional and experiential. It occurs as a by-product of other activities such as working (e.g., Marsick & Watkins, 2015, p. 6; UNESCO Institute for Statistics, 2012, p. 19). This learning is also referred to as implicit learning (Eraut, 2004) or incidental learning (Marsick & Watkins, 2015). Though less conscious, this informal learning is considered as a vital source of teachers' professional development. Work task characteristics that foster informal workplace learning include newness, complexity, collaboration and so forth (Hoekstra, 2007; Lohman, 2003; Rausch, 2013; Kwakman, 2003) many of which, as discussed above, are also likely to cause stress (Karasek, 1979).

- Billett?!
- Karasek
  - Studies on Karasek
    - The Job Demand-Control (-Support) Model and psychological well-being: A review of 20 years of empirical research (https://doi.org/10.1080/026783799296084)
    -

1. Billett and others (which characteristics of the situation and the activity foster learning?!)
2. Consideration of stress (Karasek, …)

   use stress as a characteristic of activities to introduce Karasek (and briefly talk about negative consequences: Lazarus & Folkman)

get concrete: Teachers' Learning Activities

2.3 Learning Outomes from Teachers' Workplace Learning

- Goal: categorizing learning outcomes that stem from teachers' informal workplace learning
- For this, existing frameworks from workplace learning literature are analyzed and compared
- Then, a category framework is developed deductively from existing frameworks and then adjusted inductively from the results from this study.

2.3.1 Eraut (2004)

8 categories:

-
-

2.3.2 Tynjälä (2013, 3-P model)

2.3.3 Kyndt et al. (2013)

2.3.4 Cerasoli et al. (2018)

2.3.5 Park (2020)

2.3.6 Smet et al. (2022)

–> also consider additional frameworks from teacher professional development

2.4 Job Demands and Job Resources in the Teaching Profession

2.4.1 Job Demands / Stress

2.4.2 Job Resources / Coping

2.4.3 The Effect of Job Demands / Stress and Job Resources / Coping on Vocational Teachers' Workplace Learning

3 Description of the Longitudinal Study

3.1 Research Design and Sample

This study is part of a research programme (AARL-BS) which was initiated to investigate the relations between working hours, work activities, and work experience, such as learning, stress and coping of teachers at vocational schools. Data was collected in two studies, an online survey study and an app-based diary study. This allowed for balancing the advantages and disadvantages of the respective methods regarding the estimation of working hours and the measuring of work experience, in particular. Participation was voluntary and all participants provided written informed consent.

3.1.1 Questionnaire Study

The survey study was conducted from February to November 2022. A sample of 1,146 full-time teachers participated in the survey study, 74.3 % of which held no further management function beyond their teaching duties. The mean age was 46.98 years and 39.1 % of the sample is female. The distribution of the survey sample is representative for vocational teachers in the German federal state of Baden-Wuerttemberg with regard to gender, age composition, level of employment, and administrative district.

In the survey study, data on teachers' working time, the distribution of the working hours between different tasks, working conditions, job satisfaction, and further constructs were collected. The questionnaire was developed on the basis of a comprehensive literature review (Aprea & Sarochan, 2023) and intensive consultations with representatives of the Association of Vocational School Teachers in Baden-Württemberg (BLV). See the other papers

3.1.2 Diary Study (go more into detail here, ESM, design)

The diary study took place from mid-March to mid-October 2022, including weekends and vacation periods, excluding four weeks during the summer holiday. A multi-cohort design was chosen to reduce participant burden. Each of the five cohorts held the diary for one week and paused for four weeks. The diary app was implemented using mQuest by the German online service provider Cluetec (Karlsruhe). Diary entries from 145 full-time teachers were included, 75.2 % of which without a management function. The mean age is 44.99 years and 46.9 % of the sample is female. After intensive data preparation and filtering, the analysis is based on 10.327 activities that were reported in the diary app.

The participants were requested to record all work-related activities by selecting the respective work activity from a given list of activities, indicating start and end time and answering one item each for experienced stress, coping, and learning related to the respective task. In addition, in a weekly review, the participants were requested to indicate the working hours for each day of the past week. During a cohort's diary period, three daily notifications reminded the participants to record their work activities.

3.2 Measures and Data Analysis

- Stress, Coping and Learning across the Daily Work Activities
  - Stress, coping and learning were all measured using 1 item scales self report
  - Description of the Developed Task Framework

From bwpat

Afterwards, the perception of stress, coping and learning at the given work activity are evaluated by the participants. (1) Stress, (2) coping and (3) learning are each designed with an 8-point Likert-scale with 0 as the lowest and 7 as the highest value. To avoid influencing entries with a default value, "-1" is set as the default value in these three items and must be changed to proceed. All three questions are depicted with a slider to set the value and a brief explanation: (1) Did you find this work activity stressful? (0 = not at all stressful; 7 = very stressful; -1 = invalid entry); (2) How well were you able to cope with this stress? (0 = not coped well at all; 7 = coped very well; -1 = invalid entry); (3) Did you learn anything new for your job during this work activity? (0 = learned nothing at all; 7 = learned very much; -1 = invalid entry). Based on theoretical assumptions, participants could only evaluate their coping for work activities with a stress-level above 0.

3.2.1 Learning Outcome Framework (RQ 2)

K. Kompetenzebene

KI. Individuum

Performanzebene

3.3 Data Analysis (still from bwpat)

Descriptive statistics were calculated to address RQ1 to RQ3. Regarding RQ4, a multiple linear regression analysis was conducted to investigate the statistical prediction of job satisfaction based on working hours, management function, stress, coping, and learning. Interaction terms were checked. However, moderators showed no significant effects, so no interactions were included in the final analysis.

4 Results

4.1 RQ1: Stress, Coping and Learning during Teachers' Daily Work Activities

- maybe too similar to bwpat article
- may cause problems in comparison with bwpat paper (different sample size...)
- same approach as in bwpat paper: simple comparison of mean values and SDs across the acivities
- 29 activities?! –> decision needed!

```
# make sure coping is given only for stress above 0 and never -1
# something like this...
# df_rq3_coping <- df_rq3 %>%
#  mutate(coping = ifelse(coping < 0, 0, coping))

# act_no 29 does not exist... -> correct!

rq1_stress_coping_learn <- df_rq1 %>%
  group_by(act_no) %>%
  summarise(stress_m = mean(stress),
            stress_sd = sd(stress),
            stress_md = median(stress),

            coping_m = mean(coping),
            coping_sd = sd(coping),
            coping_md = median(coping),

            learn_m = mean(pc_learn),
            learn_sd = sd(pc_learn),
            learn_md = median(pc_learn)
            )
```

```
## Warning: There was 1 warning in `mutate()`.
## i In argument: `across(...)`.
## Caused by warning:
## ! Use of bare predicate functions was deprecated in tidyselect 1.1.0.
## i Please use wrap predicates in `where()` instead.
##   # Was:
##   data %>% select(is.numeric)
##
##   # Now:
##   data %>% select(where(is.numeric))
```

Table 1: Descriptive Statistics regarding Stress, Coping and Learning during Teachers' Daily Work Activities

Activity	Stress			Coping			Learning		
	M	SD	Mdn	M	SD	Mdn	M	SD	Mdn
1	1.55	1.72	1.00	2.40	2.58	1.00	0.71	1.26	0.00
2	1.82	2.04	1.00	2.27	2.52	1.00	0.73	1.45	0.00
3	1.33	1.66	1.00	2.14	2.55	1.00	0.66	1.29	0.00
4	1.30	1.69	1.00	2.04	2.57	0.00	0.44	1.09	0.00
5	1.24	1.67	0.00	2.02	2.59	0.00	0.50	1.11	0.00

6	0.96	1.50	0.00	1.78	2.53	0.00	0.83	1.50	0.00
7	1.13	1.56	0.00	2.00	2.59	0.00	0.88	1.52	0.00
8	0.79	1.26	0.00	1.76	2.56	0.00	0.41	1.00	0.00
9	0.93	1.52	0.00	1.59	2.49	0.00	0.20	0.77	0.00
10	0.32	0.97	0.00	0.59	1.67	0.00	0.24	0.93	0.00
11	0.85	1.52	0.00	1.20	2.15	0.00	0.10	0.50	0.00
12	1.47	1.77	1.00	2.05	2.48	1.00	3.34	2.43	3.00
13	0.98	1.41	0.00	2.04	2.61	0.00	3.20	2.17	3.00
14	1.38	1.68	1.00	2.52	2.82	1.00	1.47	1.93	0.00
15	1.73	1.98	1.00	2.32	2.64	1.00	0.25	0.94	0.00
16	1.29	1.67	1.00	2.15	2.58	0.00	1.40	1.81	1.00
17	1.39	1.74	1.00	1.78	2.32	0.00	0.88	1.44	0.00
18	1.59	1.71	1.00	2.56	2.66	2.00	1.73	2.09	1.00
19	1.83	1.92	1.00	2.40	2.55	2.00	0.85	1.55	0.00
20	0.79	1.11	0.00	2.10	2.69	0.00	0.72	1.36	0.00
21	1.33	1.71	1.00	2.01	2.52	0.00	0.95	1.57	0.00
22	1.44	1.65	1.00	2.35	2.54	1.00	0.45	1.00	0.00
23	1.38	1.63	1.00	2.17	2.43	1.00	0.90	1.35	0.00
24	1.75	1.80	1.00	2.48	2.56	2.00	0.61	1.24	0.00
25	1.51	1.70	1.00	2.23	2.46	1.00	1.09	1.66	0.00
26	1.61	1.84	1.00	2.71	2.72	2.00	0.78	1.33	0.00
27	1.60	1.85	1.00	2.17	2.40	1.50	1.01	1.48	0.00
28	1.27	1.53	1.00	2.30	2.57	1.00	1.12	1.64	0.00
29	1.53	1.93	1.00	1.75	2.33	0.00	0.93	1.73	0.00
NA	0.96	1.39	0.00	1.51	2.26	0.00	0.72	1.35	0.00

4.2 RQ2: Description of the Learning During Teachers' Daily Work Activities

```
# PC_LEARN
# mean, sd, median of learning

# LEARN FREETEXT FIELDS
#
```

```
df_rq2_ <- df_rq2

# compare with coding (contains only unique values)
df_rq2_ <- df_rq2 %>%
  left_join(lo_categorization, by = join_by(learn_descr == learning_outcome))
```

```
## Warning in left_join(., lo_categorization, by = join_by(learn_descr == learning_outcome)): Detected a
## i Row 2 of `x` matches multiple rows in `y`.
## i Row 107 of `y` matches multiple rows in `x`.
## i If a many-to-many relationship is expected, set `relationship =
##   "many-to-many"` to silence this warning.
```

```
df_rq2_ <- df_rq2_ %>%
  mutate(cat = tolower(cat))
df_rq2_$cat <- as.factor(df_rq2_$cat)
table(df_rq2_$cat)
```

```
##
##                           bewusstsein der bedeutung von gelassenheit
##                                                                   10
## bewusstsein der bedeutung von gewissenhaftem, sorgfältigen arbeiten
##                                                                71979
##                          bewusstsein der bedeutung von konzentration
##                                                                71923
##                        bewusstsein der bedeutung von selbstreflexion
##                                                                    6
##                                                          effektivität
##                                                                    2
##                                             effektivität auf teamebene
##                                                                35959
##                                                emotionale erschöpfung
##                                                                   11
##                                                   emotionsregulation
##                                                                    4
##                                          fähigkeit zur selbstreflexion
##                                                                71982
##                                          festigung der eigenen routine
##                                                                   77
##                                          festigung von kernkompetenzen
##                                                                  175
##                                             gegenseitige unterstützung
##                                                                35966
##                                                          gelassenheit
##                                                                35980
##                                   gemeinsame planung und problemlösung
##                                                                   16
##                                 gewissenhaftes, sorgfältiges arbeiten
##                                                                   54
##                                       jobunzufriedenheit/frustration
##                                                                   20
##                                                    jobzufriedenheit
##                                                                    6
##                                       lernen neuer arbeitsmethoden
##                                                                71945
##                                                           motivation
##                                                                    2
##                                                               nichts
##                                                                48378
##                            pausenbewusstsein und ressourcenschonung
##                                                                   31
##                                  positive einstellung zur teamarbeit
##                                                               143927
##                                          psychologische sicherheit
##                                                                    7
##                                            reduzierung von fehlern
##                                                                35959
##                                               situationsdiagnostik
##                                                               180414
##                                                            sonstiges
##                                                                   30
##                                          vermutliche falscheingabe
```

```
##                                                                 27
##                                                  wissenserweiterung
##                                                                724
```

```
df_rq2_ <- df_rq2_ %>%
  mutate(cat = ifelse(!is.na(cat), cat,
    case_when(str_detect(learn_descr, "Keine") == TRUE ~ "Nichts"

)))

summary(str_detect(df_rq2_$learn_descr, "Keine") == TRUE)

summary(is.na(df_rq2_$cat))

df_rq2_test <- df_rq2_ %>%
  filter(is.na(cat))

df_rq2_test <- df_rq2_ %>%
  filter(is.na(cat),
         str_detect(learn_descr, "keine"))

df_rq2_test <- df_rq2_test %>%
  filter(str_detect(learn_descr, "keine "))

df_rq2_test <- df_rq2_ %>%
  filter(learn_descr == "keine")
```

```
crosstable(df_rq2_, c(activity, cat)) %>%
  as_flextable(keep_id=TRUE)

df_rq2_test_ <- df_rq2_ %>%
  filter(!is.na(cat))

rq2_crosstable <- as.data.frame(table(df_rq2_test_$act_no, df_rq2_test_$learning_outcome))
print(rq2_crosstable)


crosstable <- df_rq2_test_ %>%
  count(activity, cat) %>%
  spread(cat, n, fill = 0) # Spread the results into a wide format

crosstable_ <- crosstable %>%
  group_by(activity) %>%
  mutate(`bewusstsein der bedeutung von gelassenheit_sum`=sum(`bewusstsein der bedeutung von gelassenhe


crosstable_ <- df_rq2_test_ %>%
  count(activity, cat) %>%
  spread(cat, n, fill = 0) %>% # Spread 'cat' columns and values
  group_by(activity) %>%
  mutate(across(starts_with("bewusstsein"), sum, .names = "{.col}_sum"))

### Final Table is not correct!!!
```

```
print(crosstable)
```

4.3 RQ3: Prediction Vocational Teachers' Informal Learning Using Stress and Coping during their Daily Work Activities (as stated in Karasek's Learning Hypothesis)

- interaction effect

Table 2: Correlations between Variables RQ3

Measure	1	2	3	4	5	6	7	8	9
1. sex	—	—	—	—	—	—	—	—	—
2. age	.12	—	—	—	—	—	—	—	—
3. jobscope	.31	-.06	—	—	—	—	—	—	—
4. stress	.04	-.03	-.04	—	—	—	—	—	—
5. coping	.03	-.00	-.03	.51	—	—	—	—	—
6. pc_learn	.03	-.01	-.03	.26	.23	—	—	—	—
7. n_entry	.01	.01	.12	-.07	-.00	-.07	—	—	—
8. stress_z	.04	-.03	-.04	1.00	.51	.26	-.07	—	—
9. coping_z	.03	-.00	-.03	.51	1.00	.23	-.00	.51	—

Table 3: ICC RQ3 (REML)

ICC_adjusted	ICC_conditional	ICC_unadjusted	Freq
0.2861	0.2861	0.2861	1

Table 4: Summary Multilevel Model RQ3

	Model 1	Model 2
(Intercept)	0.828***	1.542***
	(0.037)	(0.263)
	(<0.001)	(<0.001)
	[0.756, 0.900]	[1.027, 2.057]
sex		0.074
		(0.071)
		(0.295)
		[−0.065, 0.213]
age		−0.007*
		(0.003)
		(0.049)
		[−0.013, 0.000]
jobscope		−0.003
		(0.002)
		(0.153)
		[−0.008, 0.001]
stress_z		0.168***
		(0.007)
		(<0.001)
		[0.154, 0.183]
coping_z		0.082***
		(0.007)
		(<0.001)
		[0.068, 0.097]
n_entry		0.000
		(0.000)
		(0.179)
		[0.000, 0.000]
act_no_1		−0.269***
		(0.036)
		(<0.001)
		[−0.339, −0.198]
act_no_2		−0.301***
		(0.080)
		(<0.001)
		[−0.458, −0.144]
act_no_3		−0.294***
		(0.035)
		(<0.001)
		[−0.364, −0.224]
act_no_4		−0.468***
		(0.043)
		(<0.001)
		[−0.553, −0.383]
act_no_5		−0.374***
		(0.044)
		(<0.001)
		[−0.460, −0.288]
act_no_6		−0.078*
		(0.038)
		(0.040)
		[−0.152, −0.003]
act_no_7		−0.157*
		(0.061)
		(0.010)
		[−0.277, −0.037]

5 Conclusion

6 Data availability statement

The anonymized data are available on Mendeley Data (https://www.elsevier.com/researcher/author/tools-and-resources/research-data) under the following link: …

7 References

Rausch, A. (2014). Using Diaries in Research on Work and Learning. In C. Harteis, A. Rausch, & J. Seifried (Eds.), *Discourses on Professional Learning* (Vol. 9, pp. 341–366). Springer Netherlands. https://doi.org/10.1007/978-94-007-7012-6_17

8 Appendix