



# Factors Explaining Workplace Learning of Turkish Research Assistants

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## Abstract

The purpose of this study was to explore the structural relationships among diverse variables to provide a comprehensive understanding of Turkish research assistants' workplace learning. The cross-sectional data of the study were collected online from 21 universities around Turkey. A total of 1218 research assistants from various disciplines took part in the study. The findings revealed that workplace affordances as well as the personal factors of workplace effort and personal agency had direct, positive, and statistically significant effects on the workplace learning of research assistants. The rest of the personal factors including vocational identity, workplace identity, and interpersonal agency had statistically significant direct effects on workplace affordances. Moreover, these three personal factors had statistically significant indirect effects on workplace learning. These findings showed that research assistants' workplace learning was impacted by both what the workplaces offered and how the research assistants perceived these affordances. The findings also showed that some of the personal variables affected workplace learning independent of workplace affordances.

**Keywords** Workplace learning · Workplace affordances · Personal agency · Interpersonal agency · Vocational identity · Workplace identity · Workplace effort · Research assistants

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## Introduction

Due to the rapid transformation of society and work, interest in workplace learning has been increasing since the beginning of the 1990s. Developments in information and communication technologies, growing knowledge production, increased globalization, and changes in the nature, content, and organization of professions have pushed both educational institutions and professional organizations to find new ways to ensure the level of workforce competence required to meet evolving needs (Tynjälä, 2008). Thus, enabling continuous learning has become important not only for individuals themselves living in the information society but also for organizations competing in international markets. Within this context, workplace learning has a distinctive place to ensure continuous learning to adapt to changes in the workplace. One of these workplaces is the university. As a part of the natural requirement of their career development, academics need to constantly improve their abilities, skills, and knowledge. The professional development of academics also plays a critical role in the quality of teaching and learning processes carried out at universities (Devlin, 2006). Indeed, achieving the goals of universities to contribute to social, cultural, economic, and technological development depends on the training of highly qualified academics (Yılmaz & Şahin, 2016).

In most of the higher education institutions in Turkey, academic staff is required to carry out teaching and research activities simultaneously. The first step of an academic position is being a research assistant at a Turkish university (Yaya & Atanur Başkan, 2013). Research assistants are obliged to continue their graduate education, and they also work to support their departments by undertaking teaching and administrative duties. These two duties are not necessarily conducted in the same university because research assistants can work at one university while they are graduate students at another. Conducting research is not a requirement for their job positions; however, most of the institutions where they continue their graduate education require publication as a part of that process. Since being a graduate student is a prerequisite to applying for and maintaining a research assistantship position (The Law on Turkish Higher Education, 1981), the majority of research assistants in Turkey is graduate students. The rest are individuals who already have completed their doctoral education but have not found a higher-ranking position yet and so continue working as research assistants. Research assistants constantly improve their knowledge and skills through their duties in their departments and their graduate education. They constitute a large portion of the academic staff in Turkey. According to the Council of Higher Education (CHE) statistics, 29% ( $n=52,361$ ) of all academic staff in Turkish universities are research assistants (CHE, 2021).

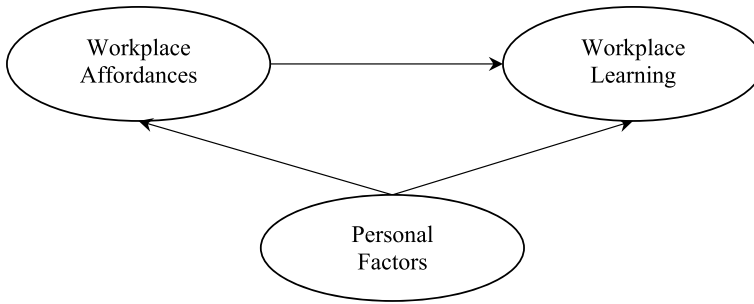
To our knowledge, research to date has not focused on providing a comprehensive understanding of research assistants' workplace learning. Although some studies focused on the workplace learning of academics, they are qualitative studies providing explanations of subjective experiences of mostly early-career academics but not of research assistants per se (e.g., Amundsen & McAlpine, 2009;

Remmik et al., 2011; Saroyan & Trigwell, 2015). Studies involving specifically research assistants have dealt with some aspects related to workplace learning such as the legal status of a research assistantship (e.g., Çolak, 2015), job definition, duties, and responsibilities (e.g., Kısa, 2014), work-related problems (e.g., Şengül Avşar & Barış Pekmezci, 2020) or their perceptions of other variables such as organizational justice, organizational silence, etc. (e.g., İzci, 2018). Another group of researchers has dealt with research assistants' professional development/learning and obstacles to personal and career development (e.g., Bakioğlu & Yaman, 2004; Yılmaz & Şahin, 2016). Whilst some research has revealed important aspects related to workplace learning of research assistants, the causal relationships between these factors have not been established. Therefore, it is not clear how research assistants learn at their workplaces and which factors influence their learning. The current study explores the structural relationships among diverse variables to provide an understanding of research assistants' workplace learning.

## Theoretical Background

The theoretical background of the current study has been built upon the knowledge base established since the 1970s regarding the influence of personal and workplace factors on workplace learning (Billett, 2001a, b, 2006a; Cerasoli et al., 2018; Coetzer, 2007; Marsick & Watkins, 1990; Schön, 1983; Tannenbaum, 1997; Tynjälä, 2013). Accordingly, workplace learning of individuals is shaped both by their personal characteristics and by the opportunities provided by workplaces (affordances) (Billett, 2001a, b, 2006a). Thus, the literature review reveals three general concepts of workplace learning, which are workplace learning itself, workplace affordances, and personal factors. From a wider perspective, it can be expressed that these elements are consistent with Bandura's (1986) model explaining human behavior (workplace learning in this context) through interactions with the personal and environmental factors.

Workplace learning occurs through engaging with daily work activities and participating in learning practices (Billett, 2002a). To understand workplace learning, one needs to understand how individuals decide to participate in work activities and what support and guidance their workplaces offer (Billett, 2002b). In other words, workplace learning is determined by personal factors and workplace affordances. However, personal factors play a pivotal role since they influence how individuals perceive workplace affordances (Billett, 2014). Thus, based on both these explanations and the abundant body of research and theories (e.g., Decius et al., 2021; Marsick & Watkins, 1990; Schön, 1983; Tannenbaum, 1997; Tynjälä, 2013), we interpreted the nature of the relationships among the general constructs in the model as presented in Fig. 1.



**Fig. 1** The theoretical model of workplace learning

## Conceptual Framework

### Workplace Learning and Affordances

To operationalize workplace learning, it is necessary to understand different aspects of it. One of these aspects is interactional and it is one of the most significant sources of workplace learning (Billett, 2004). Close or proximal guidance by expert others (e.g., supervisors) and other workers (colleagues) at workplace provide opportunities for learners to secure learning (Billett, 1996). Other two aspects of learning are cognitive (e.g., reflecting) and behavioral (e.g., experimenting) (Billett, 1996, 2000). Considering these aspects of workplace learning, Nikolova et al. (2014) developed an instrument to measure the affordances provided by workplaces in terms of these aspects. The developers of the instrument approached workplace learning as a process based on Billett's (2004) views. In the current study, we used this instrument to measure workplace affordances because it is aligned with aspects of workplace learning explained previously. Moreover, since this instrument is based on four aspects of workplace learning, we slightly modified the instrument so that it could measure the actual workplace learning through these aspects and used it as well.

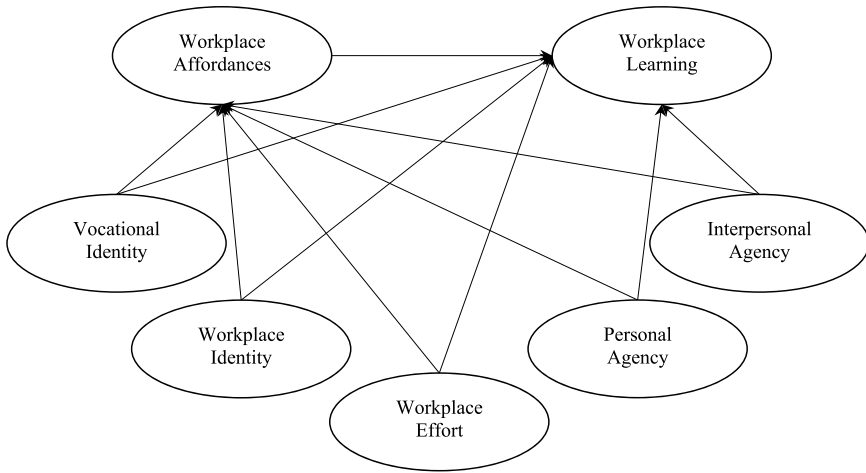
### Personal Factors

Since it was not possible to include all possible personal factors in a single study, we tried to determine important ones to include. Identity, agency, and effort can be regarded as important personal factors (Billett, 2006a, 2014; Billett & Somerville, 2004). Empirical findings support their importance (Billett & Pavlova, 2005; Bishop, 2017; Klotz et al., 2014; Wojecki, 2007). They shape individuals' cognitive experiences of making sense, interpreting, and constructing what is afforded to them so that they can play effective roles in their workplaces (Billett, 2008). With two colleagues, Billett developed an instrument to measure identity and effort (Klotz et al., 2014). In their study, they defined two aspects of identity as vocational and workplace. The former type of identity refers to the actual vocation in a broad sense while the latter one refers to a person's specific workplace (Klotz et al., 2014). In

the same study, effort was also measured. It is another important personal factor that helps employees overcome the limitations of workplaces (Billett, 2001b) and it is a prerequisite for workplace performance (Klotz et al., 2014). Effort (i.e., working) leads to workplace learning (Billett, 2002a). In the current study, this instrument was used to measure vocational and workplace identities as well as workplace effort since this instrument was based on the theoretical understanding guiding this paper. Additionally, agency refers to the willful and purposeful nature of the human activity. The scope of individuals' learning is determined by their own, not others' agency (Billett, 2009). Billett and Pavlova (2005) emphasize two aspects of agency: personal and social. They refer to individual contributions to thinking and acting and social contributions to cognition, respectively. These aspects of agencies are consistent with direct personal control and socially mediated proxy control concepts of Bandura (1997). Based on these two aspects of agency, Smith et al. (1999) developed an instrument to measure personal and interpersonal agencies of adults. We selected this instrument in the current study since it is aligned with the theoretical background underlying this research.

### Development of the Proposed Model

More research is needed to understand the workplace learning of individuals in different contexts (Grant Wofford et al., 2013; Sjöberg & Holmgren, 2021). To our knowledge, no study has examined the workplace learning of research assistants working at universities. Our purpose was to understand the workplace learning of research assistants in Turkey using a structural model based on contemporary views of workplace learning. The theoretical model presented in Fig. 1 laid the foundation of the nature of relationships among specific variables in this study. Accordingly, we proposed that workplace learning of research assistants was influenced both by workplace affordances and personal factors. Both theoretical (Billett, 2001a, b; Tynjälä, 2013) and empirical studies (Kwakman, 2003; Milligan et al., 2015; van Veelen et al., 2017) show that workplace affordances positively affect the workplace learning of individuals. Even though workplace affordances are one of the key determinants of workplace learning (Billett, 2001b), personal factors are also important because they influence individuals' choices in taking advantage of these affordances (Billett, 2006b, 2014). In other words, the limitations of low workplace affordances might be overcome by employees through their efforts (Billett, 2001b), or high affordances might be rejected by them (Billett, 2014). Thus, they play a central role in understanding individuals' workplace learning and their participation in activities where learning occurs (Billett, 2009). Therefore, it can be stated that personal factors impact how individuals perceive workplace characteristics (Billett, 2014). So, we proposed that personal factors influenced workplace affordances as well as workplace learning. In our proposed model, workplace learning and workplace learning potential were treated as single constructs feeding their respective factors. On the other hand, vocational identity, workplace identity, workplace effort, personal agency, and interpersonal agency were not fed by a higher construct. This allowed



**Fig. 2** The proposed model

us to see their distinct impacts on workplace learning and workplace affordances (see Fig. 2).

## Method

This study was conducted in two stages. In the first stage, the adaptation of data collection tools into Turkish was made. In this stage, the steps including (1) translation, (2) synthesis of the translations, (3) evaluation by a committee of experts, and (4) evaluation by intended sample were taken (Borsa et al., 2012). Accordingly, (1) four translators provided the Turkish version of the items of three instruments (Workplace Learning Scale is a modified version of Learning Potential of Workplace). (2) These four versions of each instrument were carefully examined by the authors, who are fluent in both languages, and the item which reflected the original meaning best was selected over other three items. Thus, single Turkish version for each instrument was obtained. Back-translation process was not carried out since it involves some risks such as focusing too heavily on grammatical issues at the expense of contextual ones and disregarding cultural, idiomatic, linguistic, or contextual aspects (Borsa et al., 2012; Gudmundsson, 2009). (3) Then, two Turkish language experts reviewed the items in terms of grammar and writing rules, which resulted in minor revisions in two items. Apart from language experts, four experts that had a Ph.D. in different fields of education (guidance and counseling, educational administration, curriculum and instruction, and measurement and evaluation) reviewed the items in terms of general structure, design, instructions in the instruments, content, and scale's ability to measure the target construct, which resulted in minor improvements in five items. (4) Finally, the instruments were evaluated by the intended sample ( $n=2$ ). During this step, two research assistants were asked to read the items aloud, state what they understand from each item, and think their answer aloud while the whole

process was recorded. When they finished responding the items, they were asked whether they had any difficulty in understanding any of the items. The recordings were examined as well. This process revealed that all of the items were understood as they were intended by the target group. For the Workplace Learning Scale, a different path was followed only for the first step where we modified the Turkish version of the Learning Potential of the Workplace scale so that the instrument could measure the actual workplace learning of research assistants. The rest of the steps explained above includes this instrument as well. After these four steps, the data were collected from two different samples, which have been described in the data collection. The results of the analyses conducted for the adaptation of instruments have been presented under their respective titles in instruments. In the second stage, the proposed model was tested using structural equation modeling. In this stage, data were collected from a different sample used in the first stage.

## Data Collection

In this study, the data were collected in two stages since we did not want to investigate the structural relations among the variables before we obtain validity and reliability evidence of instruments' Turkish versions. Therefore, stage 1 involved data collection to adapt the instruments into Turkish. In this stage, we utilized two samples (samples 1 and 2) since the number of items in total was high and high number of items is known to reduce the response rate in online data collection process (Marcus et al., 2007). The difference between the number of participants in samples 1 and 2 was not intentional. However, we had another researcher helped us send e-mails to target universities and the number of items was less in Sample 2, which might have increased the sample size. Sample 3 was used for the main study in the second stage. All data were collected online through e-mails. The participants took part in the study only once, meaning that each sample had unique participants. Each sample involved both major and minor universities. In each sample, the majority were female and doctoral students: Social, Human, and Administrative Sciences provided the largest percentage of participants (See Table 1).

Sample 1 involved 296 research assistants working at nine different universities. Their age ranged from 22 to 46 ( $M=29.55$ ,  $SD=3.68$ ). The duration of working as research assistants ranged from 6 months to 18 years ( $M=4.21$ ,  $SD=2.70$ ). Sample 2 was composed of 607 research assistants working at 14 different universities. The age of participants ranged from 22 to 50 ( $M=29.46$ ,  $SD=3.55$ ). The duration of working as research assistants ranged from 6 months to 16 years ( $M=3.93$ ,  $SD=2.59$ ).

The data for the second stage of the study were collected from 21 universities around the seven geographical regions of Turkey, which constituted Sample 3. From each geographical region, the three universities that employed the highest number of research assistants were selected (CHE, 2021). A total of 17,636 research assistants were working at these universities. The e-mail addresses of 10,278 research assistants were obtained from the official websites of the universities and they were invited through e-mails to participate in the study. A total of 1218 research assistants

**Table 1** Description of participants

Variable	Sample 1		Sample 2		Sample 3	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Gender						
Female	169	57.1	322	53.0	765	62.8
Male	127	42.9	285	47.0	453	37.2
Discipline						
Social, Human, and Administrative Sciences	85	28.7	143	23.6	411	33.7
Health Sciences	50	16.9	84	13.8	199	16.3
Engineering	31	10.5	139	22.9	197	16.2
Educational Sciences	48	16.2	73	12.0	171	14.0
Science and Mathematics	10	3.4	43	7.1	91	7.5
Architecture, Planning, and Design	8	2.7	12	2.0	38	3.1
Agriculture, Forestry, and Fisheries	9	3.0	14	2.3	23	1.9
Fine Arts	9	3.0	4	0.7	16	1.3
Sport Sciences	6	2.0	9	1.5	15	1.2
Theology	13	4.4	24	4.0	8	0.7
Law	5	1.7	10	1.6	5	0.4
Philology	6	2.0	25	4.1	4	0.3
Unknown	16	5.4	27	4.4	40	3.3
Educational Attainment						
Doctoral Student	202	68.2	408	67.2	851	69.9
Doctoral Graduate	34	11.5	71	11.7	190	15.6
Master Student	60	20.3	128	21.1	146	12
Unknown					31	2.5
Total	296	100	607	100	1218	100

elected to participate in the study for a response rate of 11.9%. The age of the participants ranged from 23 to 44 ( $M=30.02$ ,  $SD=3.35$ ). The duration of working as research assistants ranged from 6 months to 17 years ( $M=4.83$ ,  $SD=2.71$ ).

## Instruments

### Learning Potential of the Workplace

This scale was developed by Nikolova et al. (2014) to measure the learning potential of a workplace. The scale is composed of 12 items under four factors (three items in each factor). In the current study, slight changes in three items of Learning Potential from the Supervisor factor were made to address the higher education context in Turkey. For example, the original item ‘My supervisor helps me see my mistakes as a learning experience’ was changed to ‘My seniors at my workplace help me see my mistakes as a learning experience’; the supervisor is not a valid position in the working context of Turkish universities where higher-ranking academics (seniors)



assume the role of supervisors. Accordingly, the factors were Learning Potential through Reflection (sample item: 'In my work, I am given the opportunity to contemplate about different work methods'), Learning Potential through Experimentation (sample item: 'In my job, I can try different work methods even if that does not deliver any useful results'), Learning Potential from Colleagues (sample item: 'My colleagues tell me if I make mistakes in my work'), and Learning Potential from Seniors (sample item: 'My seniors at my workplace help me see my mistakes as a learning experience'). The items are rated on a five-point Likert scale ranging from 1 (not applicable at all) to 5 (completely applicable) with higher scores indicating a higher learning potential. In the current study, the Learning Potential of the Workplace scale was adapted to Turkish using the data collected from Sample 1. The results of confirmatory factor analysis (CFA) demonstrated that the proposed model fit the data well:  $\chi^2/df = 2.20$ , CFI = 0.97, RMSEA = 0.064 (90% CI = 0.047–0.080), and SRMR = 0.025. Cronbach alpha coefficients for the factors ranged from 0.78 to 0.95, all of which were above the 0.70 criterion of Kline (2005).

### Workplace Learning

After making adjustments in the items and factor names, the same scale developed by Nikolova et al. (2014) to measure learning potential was also used to assess the actual learning of research assistants at their workplaces. For example, the original item 'My colleagues tell me if I make mistakes in my work' was changed to 'I learn from the feedback that my colleagues provide regarding my mistakes'. This version of the scale is also composed of 12 items under four factors (three items for each factor). The factors were Learning through Reflection (sample item: 'When confronted with difficulties in my tasks, I figure out what the best possible approach is'), Learning through Experimentation (sample item: 'In my job, I find new solutions regarding task-related problems by using the time and opportunities provided to me'), Learning from Colleagues (sample item: 'I learn from my colleagues' advice when I don't know how to conduct a certain task'), and Learning from Seniors (sample item: 'I learn from tips provided by my seniors at my workplace on how to do my work'). The items are rated on a five-point Likert scale ranging from 1 (not applicable at all) to 5 (completely applicable) with higher scores indicating higher learning. In the current study, the Workplace Learning scale was adapted into Turkish using the data collected from Sample 1. The fit indices indicated a good fit with  $\chi^2/df = 1.53$ , CFI = 0.98, RMSEA = 0.042 (90% CI = 0.021–0.061), and SRMR = 0.041. Cronbach alpha coefficients for the factors ranged from 0.85 to 0.94, all of which were above the 0.70 criterion of Kline (2005).

### Vocational Identity, Workplace Identity, and Workplace Effort

The scale was developed by Klotz et al. (2014) and assesses three components: vocational identity, workplace identity, and workplace effort. Vocational Identity is composed of five items. It aims to capture 'the fit between an individual's perception of the occupational world and his or her self-perception' (Klotz et al., 2014, pp.4). A sample item is: 'My vocation is an integral part of who I am.' Workplace Identity

involves five items and measures ‘the perceived fit between a person’s sense of self and the workplace’s norms and practices’ (Klotz et al., 2014, pp.4). A sample item is: ‘My company feels a little like a home to me’. Workplace Effort involves four items and measures the intentional effort that employees direct toward work performed within the workplace (Klotz et al., 2014). A sample item is: ‘I habitually think about how to change my work in a way to make it more efficient or of higher quality’. The items are rated on a five-point Likert scale ranging from 1 (do not agree) to 5 (totally agree). In the current study, the scale was adapted into Turkish using the data collected from Sample 1. The structural validity of the scale was established using CFA:  $\chi^2/df=3.65$ , CFI=0.92, RMSEA=0.095 (90% CI=0.083–0.107), and SRMR=0.058. Cronbach alpha coefficients ranged from 0.85 to 0.96, all of which were above the 0.70 criterion of Kline (2005).

### Personal and Interpersonal Agency

This scale was developed by Smith et al. (1999) to measure the agency beliefs of adults in two dimensions: Personal Agency (8 items) and Interpersonal Agency (5 items). The items are rated on a four-point Likert scale ranging from 1 (never) to 4 (often) with higher scores indicating greater agency. Personal Agency measures to what extent an individual uses his or her own efforts and abilities to achieve desired consequences while Interpersonal Agency captures to what extent an individual interacts with others for this purpose (Smith et al., 2000). Sample items of Personal and Interpersonal Agency are: ‘I get what I want or need by relying on my own efforts and ability’ and ‘I get what I want or need by cooperating with others’, respectively. In the current study, the Personal and Interpersonal Agency scale was adapted into Turkish using the data collected from Sample 2. When adapting the scale to Turkish culture, one item from each factor was eliminated in addition to allowing two error terms to intercorrelate to improve model fit. The findings revealed a good fit of the revised model with the data:  $\chi^2/df=2.20$ , CFI=0.90, RMSEA=0.065 (90% CI=0.047–0.082), and SRMR=0.057. Cronbach alpha coefficients for the personal and interpersonal agency were 0.71 and 0.70, respectively, both of which were above or equal to the 0.70 criterion of Kline (2005).

### Analysis

Structural equation modeling (SEM) was used to test the hypothesized model in the second stage of the study. Using the SPSS 20 and MNV 1.6 packages, the data first were examined for influential outliers, normality, and multicollinearity (Hair et al., 2010). A total of 98 cases were identified as multivariate outliers using Mahalanobis distance with the criterion of  $p < 0.001$  (Kline, 2011). As recommended by Aguinis et al. (2013), the SEM was conducted twice, first with the outliers included and second with the outliers eliminated, to see whether these outliers were influential. In this study, the results indicated that the outliers were not influential. So, all the cases were maintained in the dataset. Univariate normality was checked by examining skewness and kurtosis values. For all the

variables included in the SEM, the skewness and kurtosis values were within  $\pm 2$  and  $\pm 3$ , respectively, indicating acceptable univariate normal distributions (Kline, 2011). Multivariate normality was tested using the Mardia (1970) test. The result was statistically significant, indicating violation of the multivariate normality assumption (Korkmaz et al., 2014). Therefore, the maximum likelihood robust (MLR) method was used in SEM. Finally, multicollinearity was checked by examining the correlation coefficients among all the items and factors included in the SEM. The Pearson correlation coefficients ranged from 0.01 to 0.88, all of which were below 0.90, indicating no multicollinearity (Kline, 2005).

The hypothesized model was tested in two steps as recommended by Kline (2011). In the first step, the measurement model was tested through CFA to evaluate the quality of the model specification. In this step, fit indices, parameter estimates, estimated correlations among latent variables, and factor determinacies were examined (Dilalla, 2000). In the second step, the structural regression model was tested. Fit indices, parameter estimates, direct and indirect effects on the endogenous variables, and squared multiple correlation coefficients were examined.

The fit of the model was evaluated based on normed chi-square ( $\chi^2/df$ ), comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) as suggested by MacCallum et al. (1996). The criteria indicating acceptable fit for indices were  $\chi^2/df \leq 5$  (Bollen, 1989), CFI  $\geq 0.90$  (Marsh et al., 2004), RMSEA  $\leq 0.10$  (MacCallum et al., 1996), and SRMR  $\leq 0.10$  (Kline, 2005).

## Ethical Procedures

In this study, all procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants involved in the study. More specifically, the first page of all instruments involved detailed information about the study, where they were required to confirm that they voluntarily participate in the study. A nickname was also asked so that the authors could find the specific participants in case they would want to withdraw from the study. The demographics were not too specific to reveal identities. This article was written in a way that does not cause any labeling for individuals or institutions. All efforts were made to maintain confidentiality and anonymity. Moreover, written permissions were gathered from the authors of instruments adapted into Turkish.

**Table 2** Means, standard deviations, and correlation coefficients among the model's variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1												
2	.22*	1											
3	.38*	.16*	1										
4	.15*	.18*	.52*	1									
5	.37*	.18*	.51*	.45*	1								
6	.10*	.15*	.27*	.59*	.24*	1							
7	.12*	.16*	.29*	.58*	.26*	.84*	1						
8	.07*	.22*	.15*	.35*	.20*	.38*	.41*	1					
9	.07*	.18*	.26*	.57*	.29*	.66*	.66*	.54*	1				
10	.40*	.13*	.41*	.33*	.55*	.30*	.30*	.16*	.25*	1			
11	.43*	.16*	.42*	.34*	.49*	.33*	.36*	.17*	.28*	.72*	1		
12	.19*	.28*	.20*	.29*	.35*	.27*	.29*	.62*	.38*	.32*	.39*	1	
13	.14*	.27*	.30*	.59*	.34*	.60*	.59*	.44*	.79*	.30*	.37*	.47*	1
Mean	3.44	2.74	4.01	3.09	4.23	3.07	2.96	3.75	3.20	3.97	3.84	4.13	3.44
SD	.46	.65	.90	1.14	.70	1.11	1.04	.92	1.09	.74	.78	.81	1.09

$n = 1218$ , \* $p < .05$ , 1 = Personal Agency, 2 = Interpersonal Agency, 3 = Vocational Identity, 4 = Workplace Identity, 5 = Workplace Effort, 6 = Learning Potential through Reflection, 7 = Learning Potential through Experimentation, 8 = Learning Potential from Colleagues, 9 = Learning Potential from Seniors, 10 = Learning through Reflection, 11 = Learning through Experimentation, 12 = Learning from Colleagues, 13 = Learning from Seniors

## Findings

### Descriptive Statistics

Table 2 presents mean scores, standard deviations, and Pearson correlation coefficients among the observed variables. Correlation coefficients among all of the variables were significantly ( $p < 0.05$ ) and positively intercorrelated.

### Model Fit

The only difference between the measurement and structural regression model was the addition of the structural relations to the structural model. Therefore, the fit indices and factor loadings were identical in both models (Kline, 2011). Fit indices showed that both models fit well with the data:  $\chi^2/df = 4.35$ , CFI = 0.90, RMSEA = 0.052 (90% CI = 0.051–0.054), SRMR = 0.089. The standardized factor loadings ranged from 0.51 to 0.99 indicating that factors adequately affected variables (see Supplementary Material for the complete factor loadings).

### Findings from the Measurement Model

Estimated correlations among the factors were examined. All of the 21 estimated correlation coefficients among the factors were statistically significant ( $p < 0.05$ ) and positive. They ranged from 0.14 to 0.73. According to Cohen’s (1988) criteria, the effect size is small if the value varies around 0.1, medium if it varies around 0.3, and large if it varies around 0.5. Out of these 21 correlation coefficients among the latent variables in our study, the effect sizes of seven correlations were small, five were medium, and nine were large. To check how well the factor scores were estimated, factor determinacy values were examined for the latent factors. The values ranged from 0.91 to 0.98, indicating that there were strong relationships between estimated and true scores (Muthén & Muthén, 2008). See Table 3.

### Findings from the Structural Regression Model

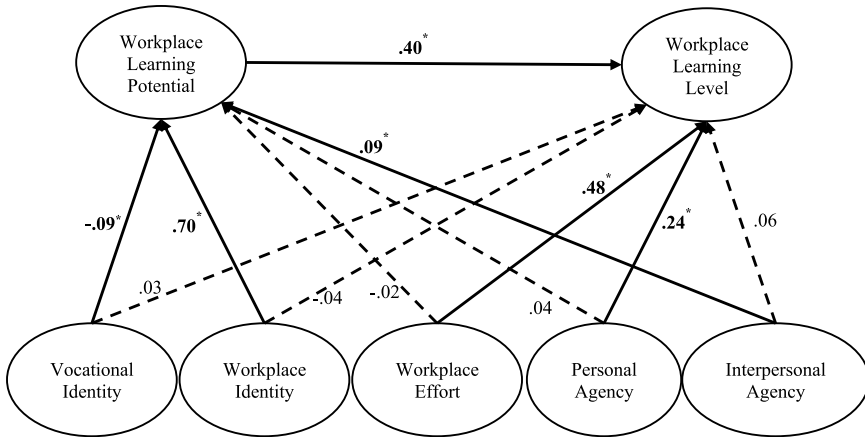
Squared multiple correlations for the endogenous variables were examined to determine the amount of variance explained by the model. The results revealed that the proposed model explained 73% and 46% of the variances in workplace learning and workplace learning potential, respectively. The standardized parameter estimates were examined to observe the direct effects of exogenous variables on both endogenous variables. Moreover, indirect and total effects on workplace learning were examined. The standardized parameter estimates revealed that 6 of 11 coefficients were statistically significant. In other words, the proposed 6 out of 11 direct effects were statistically significant. The statistically significant coefficients ranged from  $\gamma = 0.09$  to  $\gamma = 0.70$ . The standardized parameter estimates are found in Fig. 3.

The findings revealed that personal agency ( $\gamma = 0.24, p < 0.05$ ), workplace effort ( $\gamma = 0.48, p < 0.05$ ), and workplace learning potential ( $\gamma = 0.40, p < 0.05$ ) had statistically significant direct effects on research assistants’ workplace learning. On the other hand, interpersonal agency ( $\gamma = 0.09, p < 0.05$ ), vocational identity ( $\gamma = -0.09, p < 0.05$ ), and workplace identity ( $\gamma = 0.70, p < 0.05$ ) had statistically significant direct effects on research assistants’ perception of workplace learning potential. The examination of indirect and total effects demonstrated that some of the variables had

**Table 3** Factor determinacy values and estimated correlations among latent variables

Variables	Factor deter- minacy values	1	2	3	4	5	6	7
1 Personal Agency	.91	1						
2 Interpersonal Agency	.91	.25*	1					
3 Vocational Identity	.96	.46*	.18*	1				
4 Workplace Identity	.98	.17*	.21*	.54*	1			
5 Workplace Effort	.92	.45*	.22*	.59*	.50*	1		
6 Workplace Learning Potential	.96	.14*	.22*	.32*	.67*	.32*	1	
7 Workplace Learning	.92	.53*	.32*	.54*	.54*	.73*	.59*	1

$n = 1218, *p < .05$



**Fig. 3** Standardized parameter estimates. Note: The structural regression analysis was performed including all of the indicators and factors. The figure presented only the structural relations for clarity purposes. See Supplementary Material for the complete model.  $N=1218$  \* $p < .05$ , bold arrows indicate statistically significant effects, dotted arrows indicate statistically insignificant effects

indirect effects on workplace learning through the mediation of workplace learning potential. Although the interpersonal agency did not have a statistically significant direct effect on workplace learning, it had a statistically significant indirect effect through workplace learning potential (0.03). Similarly, workplace identity did not have a statistically significant direct effect on workplace learning; however, it had a statistically significant direct effect through the mediation of workplace learning potential (0.28). Finally, vocational identity did not have a statistically significant direct effect on workplace learning while the indirect effect through workplace learning potential was significant and negative (-0.04). The direct, indirect, and total effects on endogenous variables were summarized in Table 4.

## Discussion

The purpose of the present study was to investigate the structural relationships among research assistants' workplace learning, workplace affordances, and personal factors. To achieve this goal, a model was proposed based on contemporary theories of workplace learning. Findings showed that research assistants' workplace learning was affected by both workplace affordances and personal factors.

Workplace affordances exhibited an impact on research assistants' workplace learning. That is, research assistants learn more at workplaces offering more learning opportunities, which indicates the importance of workplace affordances. This finding is similar to those from studies focusing on employees working in multiple work contexts (Hilkenmeier et al., 2021) or in single fields such as finance (Milligan et al., 2015), education (Kwakman, 2003; van Veelen et al., 2017; Virtanen et al., 2014), health (Kyndt et al., 2016), human resources (Lohman, 2005), and accounting

**Table 4** Standardized direct, indirect, and total effects

	Workplace Learning Potential	Workplace Learning
Personal Agency		
Direct effects	.04	.24*
Indirect effects	-	.02
Total effects	.04	.26*
Interpersonal Agency		
Direct effects	.09*	.06
Indirect effects	-	.03*
Total effects	.09*	.09
Vocational Identity		
Direct effects	-.09*	.03
Indirect effects	-	-.04*
Total effects	-.09*	-.01
Workplace Identity		
Direct effects	.70*	-.04
Indirect effects	-	.28*
Total effects	.70*	.24*
Workplace Effort		
Direct effects	-.02	.48*
Indirect effects	-	-.01
Total effects	-.02	.47*
Workplace Learning Potential		
Direct effects	-	.40*
Indirect effects	-	-
Total effects	-	.40*

$n = 1218$ , \* $p < .05$

(Hicks et al., 2007). These studies reported that perceived opportunities or obstacles provided by workplaces affect employees' learning in the workplace.

The findings of the current study and the relevant literature mentioned in the previous paragraph demonstrate the importance of affordances in the process of learning at workplaces. Although workplaces can be classified into the two categories of enabling and constraining (Ellström et al., 2008), how individuals perceive these affordances is decisive (Billett, 2014). That is, personal factors play a role in how workers perceive affordances and to what extent benefit from them. Moreover, our study showed that how workplace affordances were perceived by the individuals depends on personal factors including vocational identity, workplace identity, and interpersonal agency and workplace affordances should be explained considering the role of personal factors. Likewise, Bryson et al. (2006) found that individuals' agency and initiative were influential in their perception of their workplaces as enabling or constraining.

Our findings demonstrated that research assistants' self-reported effort in the workplace strongly impacted their learning in the workplace; effort showed the largest impact of any variable on learning. As evidenced in the literature (Dornan et al., 2007; Fuller & Unwin, 2003) for different types of job positions, when research assistants made intentional efforts to improve work-related activities, they learned more at their workplaces. Perhaps individuals' engagement with daily work activities or learning strategies provided by the workplace results in learning in the workplace (Billett, 2002a). On the other hand, research assistants' effort in the workplace did not impact how they perceived their workplace affordances. These two findings together showed that, through their efforts, research assistants learned in their workplaces independently of the affordances they were provided.

Research assistants' workplace identity impacted their perception of workplace affordances directly and their learning in the workplace indirectly. That is, research assistants with a higher fit between their vocational sense of self and workplaces' norms and practices considered their workplace affordances as high, which in turn led to an increase in their workplace learning. This might be because research assistants who had a high fit between themselves and the workplace were able to focus on the work itself rather than trying to embrace the workplace's norms and practices. The sense of belongingness in a workplace, which is a similar construct to workplace identity, was associated with understanding the job and longer durations at work for employees in various fields (Chan, 2016; Liljedahl et al., 2016; Manninen et al., 2013).

Research assistants' vocational identity was important in how they perceived the affordances of their workplaces. It also impacted their learning in the workplace indirectly. Both associations were negative. Although the magnitudes of these effects were very small, these findings might mean that research assistants with a higher fit between their perceptions of the occupational world and their self-perceptions perceived their workplace affordances as low, which in turn caused a decrease in their workplace learning. Although this finding seems surprising, Nägele and Neuenschwander (2016) found that apprentices' perceived fit with occupation negatively affected their work-group integration. Since both workplace learning potential and workplace learning involve dimensions of learning from others, it might mean that lesser socialization might be causing lower perceptions of workplace learning potential and workplace learning.

The findings of the agency revealed that research assistants' personal agency impacted their learning in the workplace directly while it did not influence their perception of workplace affordances. Research assistants who rely on their own efforts and abilities learned more at their workplaces independent of the workplace affordances. This finding is consistent with the aforementioned results about workplace effort. These findings are congruent with theoretical background which indicates that highly active and determined individuals can overcome the limitations of low workplace affordances (Billett, 2001b) and are supported by the research literature (Ferm et al., 2018; Reeve & Tseng, 2011).

Interpersonal agency impacted the perception of workplace affordances directly while it influenced workplace learning indirectly. However, these effects were very small. Mertens et al. (2018) found that primary care professionals



mostly learned through informal interactions with others at their workplaces. Similarly, Swager et al. (2015) emphasized the role of interpersonal processes and social interactions in workplace learning and guidance.

The findings of the current study are consistent with the findings from studies focusing on the workplace learning of academics. For example, in their study, Solomon et al. (2001) concluded that the workplace learning of academics was shaped by personal, cultural, and contextual factors. Karlsson et al. (2008) emphasized the importance of trustworthy and open communication, work environment, and allocating time for sharing and reflecting in workplace learning of academics. Similarly, McAlpine and Mitra (2015) drew attention to the role of doctoral students' agency and work environments in their workplace learning. The literature involves other studies supporting the findings of the current study (Amundsen & McAlpine, 2009; Boyd, 2010; Halse, 2011; Harrison & McKeon, 2008; Jawitz, 2009; Remmik et al., 2011; Lea & Stierer, 2009; Saroyan & Trigwell, 2015; Warhurst, 2006). On the other hand, this study was distinct from others for several reasons. Firstly, it demonstrated how the personal factors played a role in perceiving what the workplaces offer to employees and what role these affordances played between personal factors and learning. Secondly, although this study was not the first one to focus on an academic setting, we found no other study focusing specifically on the workplace learning of research assistants. Thirdly, this study tried to explain the workplace learning of research assistants using a comprehensive model based on strong theoretical foundations. Finally, the findings of the study confirmed the causal relationships among diverse variables explaining workplace learning of research assistants. It was found that both affordances and personal factors affected workplace learning. Moreover, some personal factors were influential in how participants perceived affordances.

Although this study revealed important results, these results need to be interpreted considering some limitations. The first was about the distribution of participants by education level, university, and discipline. Especially in some groups (e.g., philology), there were very few participants. Although we had a large sample size, it may not mean that we had enough variability to generalize our findings to all research assistants. Secondly, the data were collected online through e-mails. Although this allowed us to reach a higher number of participants with diverse characteristics, the response rate was 11.9% in our study, which was lower than 44.1%, the mean online response rate reported for 1071 studies (Wu et al., 2022). Thirdly, the cross-sectional nature of our data prevented us from examining the change over time. Fourthly, the participants were working in Turkey. Thus, cultural factors may mediate the results. Future studies are recommended to test these relationships in other cultures and compare the results. Finally, the variables included in the model explained a large part of the variance (73%) in the workplace learning of research assistants, indicating a large effect size. Still, there may be other variables that can contribute to the explanation of the variance in workplace learning. For example, historical-cultural, societal, or other situational factors can be relevant since workplace experiences are products of those factors (Billett, 2002a). However, these factors are mostly embedded in workplaces and difficult to grasp in quantitative studies like ours. Thus, we were not able to include such variables. Therefore, although the

proposed model fit well with the data, it might not necessarily be the best or only model to explain workplace learning.

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**Informed Consent** Prior to participation in the study, all participants provided informed consent.

**Authors' Contributions** Muhammet Fatih Alkan: Conceptualization, Methodology, Formal Analysis, Data Curation, Writing - Original Draft. Esmâ Emmioğlu-Sarıkaya: Conceptualization, Methodology, Writing - Review & Editing. The author(s) read and approved the final manuscript.

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**Availability of Data and Materials** The data of this study are available upon request from the authors.

## Declarations

**Ethics Approval and Consent to Participate** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Competing Interests** The authors have no competing interests to declare that are relevant to this article.

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