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Learning Strategies at Work Scale: a Confirmatory Factor Analysis

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Abstract

The aim of this study was to gather new evidences of validity for the Learning Strategies at Work Scale (LSW). Especially, we intended to verify the initially proposed factor structure and to reduce items as to obtain a higher level of parsimony. We further addressed testing the LSW's invariance across occupations, with potentially discrepant work design characteristics (core activities vs. non-core activities). 955 Brazilian professionals that worked in a wide range of occupations participated in this study. Results of a confirmatory factor analysis support the structure of five factors, namely (1) intrinsic and extrinsic reflection, (2) mental repetition, (3) interpersonal help seeking, (4) help seeking in written material and (5) trial and error learning. In order to obtain higher parsimony, based upon psychometric criteria, five items were eliminated, resulting in better fit-indices. A multigroup analysis of this reduced scale showed invariance across the above-mentioned occupations. The study adds validity evidences for the LSW in Brazil.

Keywords: learning strategies at work; evidence of validity; invariance across occupations

Escala de Estratégias de Aprendizagem no Trabalho: uma Análise Fatorial Confirmatória

Resumo

O objetivo deste estudo foi reunir novas evidências de validade para a Escala de Estratégias de Aprendizagem no Trabalho (EAT). Especificamente, pretendemos verificar a estrutura fatorial inicialmente proposta e reduzir os itens a fim de obter um nível maior de parcimônia. Objetivamos também testar a invariância da EAT entre ocupações com características de desenho do trabalho potencialmente discrepantes (atividades fim vs. atividades meio). 955 profissionais brasileiros que trabalharam em uma variedade de ocupações participaram deste estudo. Os resultados da análise fatorial confirmatória apoiaram a estrutura de cinco fatores, nomeadamente (1) reflexão intrínseca e extrínseca, (2) repetição mental, (3) busca por ajuda interpessoal e (4) busca por ajuda em material escrito e (5) aplicação prática. A fim de obter maior parcimônia e baseados em critérios psicométricos, cinco itens foram eliminados, resultando em melhores índices de ajuste. Uma análise de múltiplos grupos dessa escala reduzida apontou invariância entre as ocupações acima mencionadas. Este estudo agrega evidências de validade para a EAT no Brasil.

Palavras-chave: estratégias de aprendizagem no trabalho, evidências de validade, invariância entre ocupações

Escala de Estrategias de Aprendizaje en el Trabajo: un Análisis Factorial Confirmatorio

Resumen

El objetivo de este estudio fue reunir nuevas evidencias de validez de la Escala de Estrategias de Aprendizaje en el Trabajo (EAT). Especificamente, pretendemos verificar la estructura factorial inicialmente propuesta, y reducir los ítems a fin de obtener un nivel mayor de parsimonia. El objetivo también fue analizar la invariancia de la EAT entre ocupaciones con características de diseño de trabajo potencialmente discrepantes (actividades finales vs. actividades medio). Participaron 955 profesionales brasileños que trabajaban en diferentes ocupaciones. Los resultados de análisis factorial confirmatorio apoyaron la estructura de cinco factores, a saber (1) reflexión intrínseca y extrínseca, (2) repetición mental, (3) búsqueda por ayuda interpersonal y (4) búsqueda por ayuda en material escrito y (5) aplicación práctica. A fin de obtener mayor parsimonia y basados en criterios psicométricos, cinco ítems fueron eliminados, teniendo como resultado mejores índices de ajuste. Un análisis de múltiples grupos de esta escala reducida muestra invariancia entre las ocupaciones arriba mencionadas. Este estudio agrega evidencias de validez para la EAT en Brasil.

Palabras-clave: estrategias de aprendizaje en el trabajo; evidencias de validez; invarianza entre ocupaciones

Labor market dynamics require individual and organizational resources to rapidly adapt to external demands to respectively keep up with their colleagues or rival companies (Hetzner, Heid, & Gruber, 2015; Manuti, Pastore, Sadigno, Giancaspro, & Morciano, 2015). A crucial resource is knowledge management via learning, as it offers development of knowledge skills and abilities (KSAs), according to Noe, Clarke and Klein (2014). Traditionally, organizations largely invest

in formal learning activities as to promote competences in their employees, which potentially affect performance and productivity (ABTD, 2014). These formal activities are expensive and usually include needs assessment, training and development design and evaluation of their effectiveness. However, a review on learning in the 21st century highlights that learning in organizations primarily occurs in informal ways (Noe, Clarke, & Klein, 2014). Workers learn while performing their

activities, under different work design arrangements. Using learning strategies at work is one way of doing it. They are the focus of the present study.

Learning strategies are practices that people use to help them achieve knowledge and skills in their professional context (Holman, Epitropaki, & Fernie, 2001). Trying out new things and reflecting upon previous experiences may be helpful in the context of occupational redefinition, emerging through the implementation of new technologies at work (Isidro-Filho, Guimarães, Perin, & Leung, 2013). Reflection also has been found to benefit competence development in managers (Brandão, Borges-Andrade, Puente-Palacios, & Laros, 2012; Moraes & Borges-Andrade, 2015). Yet, in a non-managerial stable context, seeking feedback and advices from colleagues may be more effective to promote knowledge (Anagnou & Fragoulis, 2014). Thus, the use of learning strategies, even though it might vary across occupations with distinct work design characteristics enhances professional development, as predicted by Illeris (2011) and empirically confirmed by Haemer, Borges-Andrade and Cassiano (2017).

Acknowledging that learning strategies may enhance and facilitate learning, various taxonomies were suggested. One of them defends a three-fold classification of nine strategies in cognitive strategies (reproduction, organization and elaboration of mental structures), behavioral strategies (interpersonal help seeking, help seeking in written material, practical application) and self-regulation strategies (control of emotions, motivations and understanding; Warr & Allan, 1998). An empirical test of this taxonomy, by means of psychometric analyses in a sample of responses from British workers, resulted in eight factors, joining two cognitive strategies, namely organization and elaboration of mental structures, in the factor active reflection (Warr & Downing, 2000). Based on these items and findings, a later version of this scale, also responded by British workers, excluded the self-regulation strategies for pointing out inconsistencies concerning its effects on learning success (Holman, Epitropaki, & Fernie, 2001). It also assumed a six-factor solution, separating the component of active reflection into extrinsic and intrinsic reflection.

Aiming at assessing learning strategies at work, Brandão and Borges-Andrade (2011) obtained evidences of reliability for a Brazilian scale on learning strategies at work, with a sample of 926 managers who had at least a bachelor's degree. Respondents were from different bank branches in all the Country regions.

Mostly, they were males (69%) and older than 35 years (72%). Cronbach alphas were satisfying to very good. Inspired in the above cited international taxonomies (Holman, Epitropaki, & Fernie, 2001; Warr & Allen, 1998; Warr & Downing, 2000), the study by Brandão and Borges-Andrade (2011) had the perspective to improve an earlier version of the scale in Brazil (Pantoja & Borges-Andrade, 2009), that was answered by workers with different educational levels in a wide variety of occupations. In this study, the scale presented problems in terms of construct validity. Specifically, the factors intrinsic reflection and practical application did not discriminate, and items evaluating reproduction needed improvement. Unlike the study by Holman, Epitropaki and Fernie (2001) that inspired these two Brazilian studies, both found a five-factor structure. Hence, the new version of the scale, developed by Brandão and Borges-Andrade (2011), is composed of 26 items loading on five factors, namely (a) intrinsic and extrinsic reflection, (b) mental repetition, (c) seeking interpersonal help, (d) seeking help in written material, and (e) practical application. The first two are cognitive strategies and the remaining three are behavioral strategies.

Intrinsic and extrinsic reflection is characterized by cognitive associations between current work situations and a) one's own previous work experience or b) observations in other areas of the organization. Mental repetition is the process of repeating information without any further cognitive effort. Seeking interpersonal help is outlined by proactive behavior toward colleagues with the intention to get help. On the other hand, investigating and locating information in documents, manuals and other non-social sources are behaviors that define seeking help in written material. Lastly, practical application regards trial error learning in a way that the individual knowledge is tested while learning.

Further studies found similar findings and reported the association of learning strategies to professional development in a bank (Brandão, Borges-Andrade, Puente-Palacios & Laros, 2012), in three hospitals (Isidro-Filho, Guimarães, Perin & Leung, 2013), among public officials at the city level (Moraes & Borges-Andrade, 2015); and across organizations (Haemer, Borges-Andrade, Cassiano, 2017).

However, to assure that the scores of psychological instruments measure what they pretend to measure, it is indispensable to gather validity evidences (Standards for Educational and Psychological Testing; AERA; APA; NCME, 2014). Besides initially demonstrating the

consistency of the underlying construct, a (re)evaluation of relationships to achieve a more parsimonious set of factor scores may be useful (Thompson, 2004). To the extent that the number of variables in any subsequent analysis is reduced, the quantity of degrees of freedom and the power of analysis increase. Conducting a confirmatory factor analysis assembles further construct validity and contributes to future research using the instrument.

These evidences should be obtained across occupations with distinctive characteristics of work design, since most of the research and theoretical models on workplace learning stress that this construct may be more dependent upon characteristics of work design, instead of organizational characteristics (Manuti, Pastore, Sadigno, Giancaspro, & Morciano, 2015; Noe, Clarke, & Klein, 2014). Those characteristics concern the technical-organizational learning environment and the social-cultural learning environment. That environment includes elements such as autonomy, work content and division of tasks, which may vary, for instance, if the occupation is closer to the organization's core activities or to non-core activities. The latter environment is about communities of work, social groupings and processes at the workplace, for instance, if the occupation is performed with others or alone. Both environments interact with individual level variables of the workers and may promote professional development and work identity (Illeris, 2011). Learning strategies used by individuals, at the workplace, are one of these variables. For instance, occupations closer to those core activities may not need to spend much effort in order to make extrinsic reflections, since they are usually exposed to organizational external environments and clients. Occupations closer to non-core activities may need to make more mental repetition, since they are usually required to follow more strict rules concerning budget and personnel management at the organizations. Occupations performed with others offer an opportunity to learn by seeking interpersonal help. Testing hypotheses of interactions between these learning strategies and characteristics of both learning environments requires a reliable and parsimonious measure.

The present study aimed to investigate new validity evidences for the learning strategies at work scale. Specifically, we reevaluated the five-factor structure proposed in the original validation study, seeking to reduce the scale with the purpose to attain a higher level of parsimony, and presenting new evidence for construct validity. Further, we evaluated the invariance of

the scale across occupations, with potentially distinctive characteristics of work design, namely core organizational activities and non-core organizational activities.

Method

Participants

A total of 955 college level professionals that worked in a wide range of occupations in Brazilian public and private organizations were predominantly residents of the *Federal* District (68.7%), in the central region of the Country. Another part of them lived in the States of São Paulo (6.4%) and Bahia (3.5%), in Brazilian Southeastern and Northeastern Regions. The remaining (21.4%) were residents of other Brazilian states. On average, they were 36.96 ($SD = 9.13$; $Mdn = 35.00$; $Min = 21$; $Max = 72$) years old. As a requirement for inclusion in the main study, all participants needed to have finished undergraduate studies, since the scale was not previously developed for high school professionals. About one quarter of them (25.3%), indicated also having a Master or Doctoral degree. They had been working for 10.58 ($SD = 8.52$) years and had participated in 526.38 ($SD = 1,419.98$) hours of training, with a technical (44.8%) or mixed focus (47.7%). Mostly, they were working with others (86.7%), in non-core activities (44.3%) as compared to core-activities (37.7%). For the remaining (18.0%), we were not able to identify the nature of these activities. Finally, they primarily worked in the applied life science area (54.7%), followed by human and social sciences (33.5%), and hard sciences (5.0%). Prior studies with the learning strategies at work scale did not have such a variety of organizations and were much more concentrated in just one city, except for one case.

Instruments

We used the learning strategies at work scale in its original Portuguese version (Brandão & Borges-Andrade, 2011). Participants rated 26 items that are associated to an 11-point scale, reaching from 'never use it' to 'always use it'. These items, according to previous evidences of construct validity, aggregated in five factors: (1) extrinsic and intrinsic reflection ($\alpha = 0.92$), (2) looking for interpersonal help ($\alpha = 0.88$), (3) looking for help in written material ($\alpha = 0.79$), (4) reproduction ($\alpha = 0.79$), and (5) trial and error learning ($\alpha = 0.82$). This scale was included in a large questionnaire that collected information on the participants, described in the prior section. It also included scales that measured

perception of professional development, since the present sample is part of a major study on the association between this perception, learning strategies at work and other individual and contextual factors.

Procedure

Graduate students collected our data from October 2014 to October 2015. As a criterion for inclusion in the study, they only contacted employees that had completed undergraduate studies and were working. Before starting to answer the questionnaire, they were informed, by a written text, about its objective (to identify their perceptions about professional development and how they learned at work). Moreover, the introductory text contained the name of the research coordinator, his position as a professor of the graduate program (it was named) at the University (it was named) and his institutional email for contacts, if needed. The participants were also told that they should never provide information that could personally identify them and that all data analysis would be collectively made, in order to avoid individual identification of cases. Finally, they were informed that their answers would not be evaluated as right or wrong and that their decision to participate was voluntary.

No consent document was signed, since workers associate this procedure to a means of pressing them to participate in periodically required climate and satisfaction diagnosis sponsored by their employees. These documents also raise suspicions that workers may be individually identified by association to response patterns within small organizational units and, therefore, that these patterns may result in collective or individual punishment by immediate supervisors in these units. Therefore, such suspicions would produce response bias.

Questionnaires were in either online or paper and pencil format. The later was rather an opportunity to access participants who are not familiar with online surveys than wanting to compare both response formats, and resulted in 5.45 less responses than the ones collected online. The online version did not allow for missing values and, therefore, had a higher rate of half-answered questionnaires, by those respondents who voluntarily decided to quit. Quitting participants, in the paper version, handed over blanket questionnaires. Both quitting patterns suggested that their potential respondents were effectively feeling that they were voluntary participants. Responses were merged into one database. Seven questionnaires had missing values and

were excluded from the analysis. These latter questionnaires were not from quitting participants.

Analysis

As data presented violations to univariate normality, we made box-cox transformations (Osborne, 2010). After this transformation, we attended to the criteria defined by Kline (2011), having skew values between $|-0.06|$ and $|0.10|$, and kurtosis values between $|-1.67|$ and $|-0.80|$. Further, we excluded 66 cases for being multivariate outliers (based on Mahalanobis's square distance, with $p < 0.001$). The remaining statistical assumptions for confirmatory factor analysis were satisfied. For analysis, we randomly divided the database into two.

In the first database ($N = 470$), using AMOS 20 analysis software, we tested five models: the independence model (M1), the non-correlated factors model (M2), the correlated 5-factor model (M3), the correlated 6-factor model (M4) and the second order model (M5). In order to verify the adjustment quality of the model, we compared values of CFI, TLI, RMSEA e SRMR with the critical ones suggested by Western, Gore, Chan and Catalano (2008; $CFI \geq 0.95$; $TLI \geq 0.95$; $RMSEA \leq 0.06$; $SRMR \leq 0.08$). Parameters were estimated via the maximum likelihood method (MLM) as this method tends to be more robust in relation to deviations of normality. In post hoc analysis, we used the modification indices analysis to (re)specify the model seeking a better adjustment quality of the model, knowing that we would use confirmatory factor analysis in an exploratory mode (Byrne, 2010).

In the second database, we evaluated the invariance across occupations for the five-factor correlated model (M3) of the learning strategies at work scale. In order to do so, an open-ended question on profession was classified in core-activities and non-core activities ($N_1 = 150$, $N_2 = 204$). Another potentially interesting comparison would have been the comparison of respondents that worked alone or with peers. However, the fact of having 6.32 more respondents that work with peers than alone ($N_1 = 360$, $N_2 = 57$) turns such comparison unviable. Then, we tested four invariance models: configural invariance, metric invariance, scalar invariance and strict invariance. The first one indicates the extent to which the factorial structure in both groups is equivalent (Campbell, Barry, Joe, & Finney, 2008). Additionally, the second one assumes that factorial loadings across groups are equal. If data attends to this premise, this means that similar item relations exist

for the underlying construct for both groups (Damásio, 2013). Satisfying previous invariance assumptions, scalar invariance evaluates the degree to which the intercepts in both groups are similar. Finally, the strict invariance also estimates the residuals to be equivalent (Wu, Li, & Zumbo, 2007).

Results

Initial model

Table 1 presents the adjustment indices of the five suggested models. Strictly speaking, the indices did not present a good fit as recommended by Weston et al. (2008).

Model re-specification

The correlated five-factor model seems to better adjust to data. Therefore, we re-specified this model based on modification indices indicated by AMOS. This procedure is a post-hoc analysis that uses confirmatory factor analysis in exploratory mode. We separately evaluated correlations between errors for each factor and gradually withdrew items based on psychometric criteria (statistics and content). These modifications were associated to the factors of intrinsic and extrinsic reflection, interpersonal help seeking and seeking help in written material. Overall, we eliminated five items (LS2, LS9, LS16, LS17, LS25), reducing the original scale to 21 items (Figure 1).

The intrinsic and extrinsic reflection factor was reduced from nine to six items. First, we determined a trajectory between the errors of items LS9 ('When I do my job, I think about how it is related to the business

and strategies of the organization') and LS10 ('I try to understand how the activities in different areas of the organization affect the execution of my job'). Next, we identified a trajectory between the errors of items LS25 ('I try to understand the associations between demands from other areas of the organization and the purpose of my job') and LS26 ('I try to be familiar with the way in which different areas of the organization are related with each other'). Last, we found a trajectory between the errors of items LS17 ('In order to improve the execution of my job, I try to better understand every procedure and task that is a part of my job') and LS18 ('I try to understand how different aspects of my job are related with each other'). Trajectories of errors point to redundancy of items. Thus, in every pair of items we excluded the one with the lower factorial loadings.

It should be noticed that the two of the excluded items (LS9, LS25) concern extrinsic reflection and composed this factor in the original study. As to rule out the possibility of a sample bias, we compared occupations with potentially discrepant work design characteristics. Post hoc tests compared group differences referring to activity the organizational area (core-activity, non-core activity). Descriptive statistics indicated small mean differences for the organizational area, in such manner that professionals working in non-core organizational activities attributed a higher score to the items in comparison to professionals working in core organizational activities. However, the comparison between groups for work area did not point to significant differences, $t(380) = -.95, p = .34, r = -.05$, and $t(380) = -1.38, p = 0.17, r = -.07$, respectively.

Next, the interpersonal help seeking factor was reduced from five to four items. We identified a

Table 1
Initial comparison of alternative models' adjustment (Database 1)

Model	X^2	df	X^2/df	CFI	TLI	RMSEA	SRMR
Independent (M1)	8580.73	325	26.40	<0.01	<0.01	0.23	0.44
Non-correlated factors (M2)	2146.59	299	7.17	0.78	0.76	0.11	0.35
Difference	6434.14	26	19.23	0.78	0.76	0.12	0.09
Correlated 5-factor (M3)	757.07	220	3.44	0.92	0.91	0.07	0.05
Correlated 6-factor (M4)	961.78	284	3.39	0.92	0.91	0.07	0.05
Difference	204.71	64	0.05	<.01	<.01	<.01	<.01
Second order factor (M5)	1043.63	294	3.55	0.91	0.90	0.07	0.05
Difference	81.85	10	0.16	0.01	0.01	<0.01	<0.01

N = 470

trajectory of errors between the items LS2 ('In case I have doubts about something at work, I ask my colleagues from other areas of the organization for help') and LS19 ('I try to obtain new knowledge and information asking colleagues from other teams for advice'). Once again, the correlation between error indicates content similarity and thus redundancy. Therefore, we proceeded as previously done with the intrinsic and extrinsic reflection factor.

The last modification was for two items of the seeking help in written material factor. The items LS15 ('In order to get information that I need for my job, I read information and materials published in news agencies') and LS16 ('In order to get important information for the execution of my job, I consult the internet') presented a correlation between errors. Thus, LS16 was excluded in order to reach a higher level of parsimony for this factor.

Adjustment indices for the re-specified correlated factor model can be observed in Table 2. This Table also shows standardized pattern and structure parameters for the model. With $X^2 = 510.96$, $df = 142$, $X^2/$

$df = 2.86$, $CFI = 0.95$, $TLI = 0.94$, $RMSEA = 0.06$, $SRMR = 0.05$, our final model (M6) indicates a good fit to the data. Further, composite reliability for the five factors (IER $CR = 0.93$; MR $CR = 0.82$; IHS $CR = 0.87$; HSWM $CR = 0.88$; PA $CR = 0.88$) indicate construct reliability, confirming previous findings. Table 3 presents the non-standardized pattern parameters for the final model, confidence intervals and the Wald test for each of them.

Multigroup analysis

We evaluated the four invariance models previously described for our final model in the second database ($N = 417$). As the χ^2 test has been criticized for depending on sample size and/or model complexity, we based our decision on ΔCFI , Δ Gamma Hat, and ΔNCI . Differences between indices should not result in more than 0.01, 0.001 and 0.02, respectively (Cheung & Rensvold, 2002). As may be observed in Table 4, the indices point to the equivalence of parameters, implying that the learning strategies at work scale is invariant across occupations.

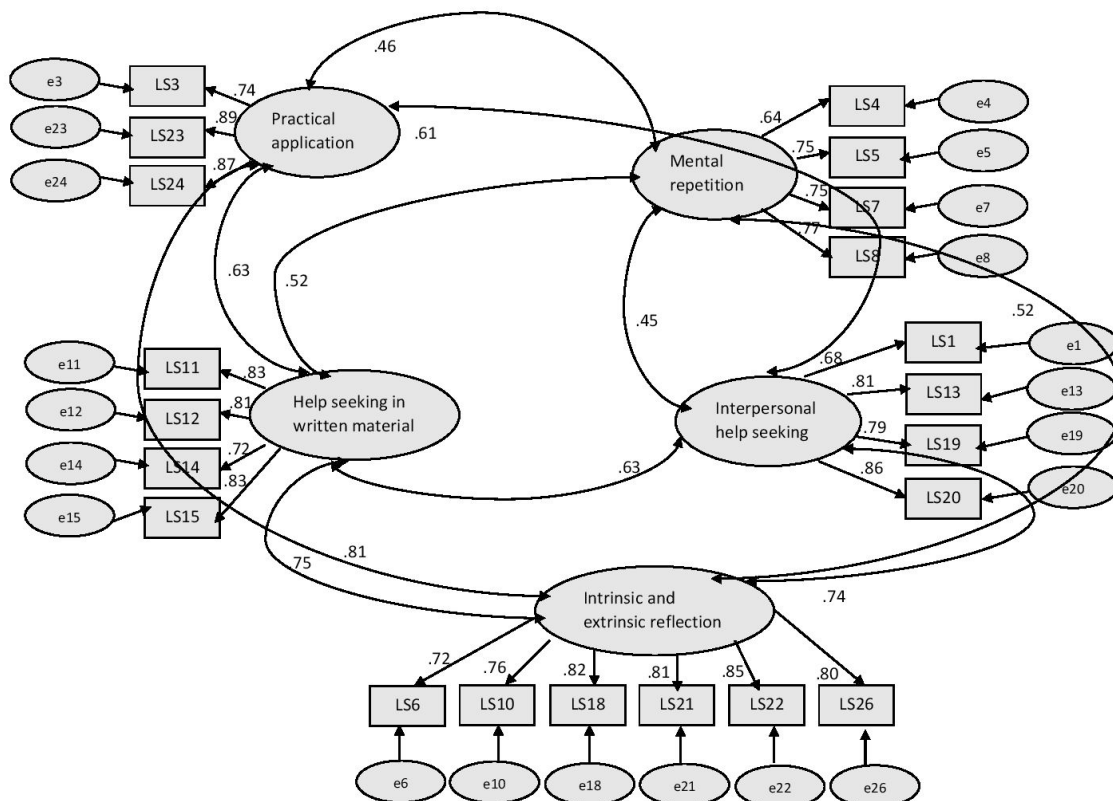


Figure 1. Path diagram of the learning strategies at work scale (final model; standardized estimates)

Table 2
Pattern and structure coefficients for the factors of the final model (M6)

Variables/ Statistics	Pattern					Structure				
	IER	MR	IHS	HSWM	PA	IER	MR	IHS	HSWM	PA
MR						0.52				
IHS						0.74	0.45			
HSWM						0.76	0.52	0.63		
PA						0.81	0.46	0.61	0.63	
LS22	0.85					0.85	0.44	0.63	0.64	0.68
LS18	0.82					0.82	0.43	0.60	0.62	0.66
LS21	0.81					0.81	0.43	0.60	0.61	0.66
LS26	0.80					0.80	0.42	0.59	0.60	0.65
LS10	0.76					0.76	0.40	0.56	0.58	0.62
LS6	0.72					0.72	0.38	0.53	0.54	0.58
LS8		0.77				0.40	0.77	0.35	0.40	0.35
LS7		0.75				0.40	0.75	0.34	0.39	0.34
LS5		0.75				0.39	0.75	0.34	0.33	0.34
LS4		0.64				0.33	0.64	0.29	0.33	0.29
LS20			0.86			0.64	0.39	0.86	0.55	0.53
LS13			0.81			0.60	0.37	0.81	0.51	0.50
LS19			0.79			0.58	0.36	0.79	0.50	0.48
LS1			0.68			0.50	0.31	0.68	0.43	0.42
LS14				0.83		0.63	0.43	0.53	0.83	0.52
LS11				0.83		0.62	0.43	0.52	0.83	0.52
LS12				0.81		0.61	0.42	0.51	0.81	0.51
LS15				0.72		0.55	0.38	0.46	0.72	0.45
LS23					0.88	0.72	0.41	0.54	0.56	0.88
LS24					0.87	0.71	0.40	0.53	0.55	0.87
LS3					0.74	0.60	0.34	0.45	0.47	0.74
VME	0.69	0.53	0.62	0.64	0.69					

N =470; the bold indices represent the correlations between factors

Discussion

Initially, we intended to investigate new validity evidences for the learning strategies at work scale. Therefore, we separately evaluated the global adjustment of the model and the adjustment of each of the five theoretically proposed factors. Next, we gradually re-specified the model, seeking to obtain its better adjustment to data through a higher level of parsimony. The final model was then tested for invariance across occupations, pointing out that the scale may be used

in any occupation, without potentially creating any response biases.

The re-specification served to refine the construct, thus increasing degrees of freedom and statistical power for subsequent analysis (Thompson, 2004). Some items may not be applicable to all occupations in the same manner or may not have similar meaning considering the organizational context. Specifically, organizations may choose to limit the access to internet in the workplace. Hence, seeking knowledge that is relevant for work in news agencies may be more salient

Table 3

Non-standardized pattern parameters of the final model (M6)

Variável	B	S.E.	CI95%	Critical Ratio
LS6	1.00			
LS10	1.29	0.07	[1.15,1.42]	16.06
LS18	1.25	0.07	[1.11, 1.39]	17.21
LS21	1.28	0.08	[1.12, 1.44]	16.99
LS22	1.42	0.08	[1.26, 1.58]	17.84
LS1	1.00			
LS13	1.16	0.07	[1.02, 1.30]	15.57
LS19	1.29	0.09	[1.11, 1.47]	15.22
LS20	1.33	0.08	[1.17, 1.49]	16.35
LS15	0,92	0.50	[-0.06, 1.9]	17.00
LS12	1.03	0.05	[0.93, 1.13]	19.64
LS11	1.00			
LS24	1.00			
LS23	1.00	0.04	[0.92, 1.08]	24.47
LS3	0.87	0.05	[0.78, 0.97]	18.85
LS4	1.00			
LS5	0.98	0.08	[0.82, 1.14]	12.63
LS7	1.08	0.09	[0.90, 1.26]	12.71
LS8	1.03	0.08	[0.87, 1.19]	12.86
LS26	1.33	0.08	[1.17 1.49]	16.79
LS14	1.04	0.05	[0.94, 1.14]	20.48

N = 470

Table 4

Adjustment indices for invariance of the final model (Database 2)

Model	X^2	df	X^2/df	ΔX^2	Δdf	$\Delta X^2/\Delta df$	CFI	ΔCFI	Gamma hat	Δ Gamma hat	NCI	Δ NCI
Configural	637.33	358	1.78				0.948		0.930		0.671	
Metric	647.25	374	1.73	9.92	16	0.62	0.949	≤ 0.01	0.930	< 0.001	0.657	0.014
Scalar	662.55	389	1.70	15.3	15	1.02	0.949	< 0.01	0.930	< 0.001	0.658	0.001
Strict	695.33	410	1.70	32.78	21	1.56	0.947	0.02	0.930	< 0.001	0.686	0.028

N = 417

than consulting other internet resources, such as social media. Therefore, these items are likely to be redundant.

A point that may not be overlooked is that all of the items originally associated to the concept of extrinsic reflection from the original scale (Holman, Epitropaki, & Fernie, 2001) were eliminated during

model re-specification. However, post hoc analysis does not indicate group differences caused by sample bias derived from occupations with potentially discrepant work design characteristics, therefore directing the attention to potential cultural differences. Comparing Brazil and the UK in terms of cultural dimensions, the

main differences refer to power distance, individualism-collectivism and uncertainty avoidance (Hofstede, 2010). Specifically, power distance in organizations is reflected in the responsibility attribution to the boss, thus likely to inhibit an individual's reflection upon association between his/her own work and organizational strategies and/or goals. Notwithstanding, if the item personalizes the relationship to other areas of the organization, it may be perceived in terms of interdependence, as a facet of collectivism and reflecting a people-oriented management.

Our final model has further shown to be invariant across occupational groups, with potentially discrepant work design characteristics, based on our operational definitions of their activity mode. In both groups, learning strategies at work do have the same (1) factorial structure, (2) factor loadings and (3) item intercepts. However, the invariance of error variances was rejected. Yet, this strong evidence for construct validity suggests that subsequent research in multiple occupational groups may be confident that differences are due to levels of the underlying psychological construct (Campbell, et al. 2008), instead of due to variance in individuals' scale perception. However, other operational definitions of work design characteristics need to be tested, related to task itself (i. e.: variety, meaning and identity), knowledge use (i. e.: complexity, information processing, problem solving), social interdependency (i. e.: initiated, received) and physical context (i. e.: appropriate furniture, required muscle effort, use of equipment). Most of the participants reside in the Federal District and the measurement instrument needs testing with workers from other regions of Brazil. The sample was by convenience and this may reduce the generalization of the findings. Further, this collection did not enable us to compare responses obtained in the online survey and via paper-pencil questionnaires. Thus, in the future, a new version of the scale, for high school level professionals, will help to expand the findings to a larger amount of workers in the Country, considering this methodical issue as well.

Our study once again pointed out strong evidences for the consistency of the construct learning strategies at work. However, evidences on predictive and convergent validity are needed. Specifically, previous research indicates that learning strategies are positively associated to competence improvement and professional development (Brandão, et al. 2012; Isidro-Filho, et al., 2013; Moraes & Borges-Andrade, 2015). However, there is a need to investigate the temporal sequence of

these variables in a predictive model, as to determine if both are associated in a linear (antecedent - consequent) or cyclical format (antecedent - consequent/consequent - antecedent). As for convergent validity, socialization in organizations and cross-cultural adaptation may be considered informal learning processes (Anderson, 1994; Ostroff & Kozlowski, 1993). Thus, adaptive strategies should be positively associated to learning strategies. Yet, subsequent empirical research needs to test these relationships.

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Learning strategies at work scale

[The below presented translation is for better comprehension only. The scale was not adapted, neither tested in an English version]

LS 1 I ask my colleagues for help, in case I need more detailed information about work.

LS 2 In case I have doubts about something at work, I ask my colleagues from other areas of the organization for help.

LS 3 In practice, I try out new ways of executing my work.

LS 4 In order to improve the execution of my work, I memorize data (rubric numbers, accounts, transactions in systems, etc.)

LS 5 For better execution of my work, I try to always follow the same procedures.

LS 6 I try to understand my work better, analyzing it critically.

LS 7 In order to execute better activities in my work, I try to repeat automatically memorized actions and procedures.

LS 8 For better execution of my work, I try to repeat mentally recently acquired information and knowledge.

LS 9 When I do my job, I think about how it is related to the business and strategies of the organization.

LS 10 I try to understand how the activities in different areas of the organization affect the execution of my job.

LS 11 If I have doubts about something at work, I seek help in publications, information, fascicles and reports edited by the organization.

LS 12 I try to understand better activities that I execute at work, consulting information available in the intranet of the organization.

LS 13 I ask my colleagues from my team if I need to learn something about my job.

LS 14 I ask my team colleagues for help when I need to learn something about work.

LS 15 In order to get information that I need for my job, I read information and materials published in news agencies.

LS 16 In order to get important information for the execution of my job, I consult the internet.

LS 17 In order to improve the execution of my job, I try to better understand every procedure and task that is a part of my job.

LS 18 I try to understand how different aspects of my job are related with each other.

LS 19 I try to obtain new knowledge and information asking colleagues from other teams for advice.

LS 20 I consult more experienced colleagues, when I have doubts about some issue associated to my work.

LS 21 For a better execution of my job, I reflect upon how it contributes to satisfy clients' expectations.

LS 22 I try to understand how my work associates to the results obtained in different areas of the organization

LS 23 I try to improve some work procedure, experimenting, in practice, new ways of executing it.

LS 24 I test new knowledge applying it to my work practice.

LS 25 I try to understand the associations between demands from other areas of the organization and the purpose of my job.

LS 26 I try to be familiar with the way in which different areas of the organization are related with each other.

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