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RESEARCH ARTICLE



## Organizational learning culture in industry 4.0: relationships with work engagement and turnover intention

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### ABSTRACT

The period of digital transformation that we are experiencing, called Industry 4.0, has marked a series of changes in the way we relate as a society, requiring constant adaptation and new knowledge on the part of companies and professionals. This study sought to contribute to the understanding of the relationship between the organizational learning culture in Information Technology companies based in Brazil, the work engagement, and the turnover intention of its employees. Among the results of the correlation and network analyses, it is shown that organizational actions aimed at *connecting the organization to its environment* dimension have a direct effect on *work engagement*. The high level of work engagement, on the other hand, has not been shown to reduce the *turnover intention*. The results of the study allow the identification of cultural aspects related to learning, which dimensions of culture are directly related to work engagement, and what are their impact on the turnover intention. They also evidence elements of the organizational culture to be prioritized in interventions, in addition to offering indications on how to develop professionals within the organizational routine.

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Organizational learning culture; work engagement; turnover intention; industry 4.0; information technology

## Introduction

Industry 4.0 has been changing the environment in which we live and the way we relate and work. Through countless technological innovations and new concepts of value chains organization, it is characterized by the development in genetics, robotics, artificial intelligence, 3D printing, among others, which are related and capable of building and expanding each other. With them, consumption and employment patterns are being created and modified, requiring adaptations by companies, the government, and individuals (Institute for Industrial Development Studies [Instituto de Estudos Para o Desenvolvimento Industrial] 2017).

In the IT market, process automation, and artificial intelligence have been growing by an average of 20% per year, with the expectation of reaching the US\$ 5 billion mark in 2024. The application of these technologies in the working world causes the redesign of work and the need for requalification, which are required to integrate people and the

extensive automation of the entire workforce (Volini et al. 2019). Replacing brick-and-mortar (physical) business operations with digital arrangements requires new technologies and production methods and, therefore, the technical knowledge of the human resource department (HRD) advances to support and facilitate such transitions (Rana and Sharma 2019). More specifically, HRD will have to provide operational workers the training needed to use the new applications while assisting senior management in keeping up with new ways of doing business (Rana and Sharma 2019).

The Brazilian sector represents 1.8% of the global IT market and 40.7% of the Latin American market. In 2019, the information technology (IT) sector grew 5.0% worldwide, while in Brazil, it reached 10.5% (US\$ 44.3 billion), considering the software markets, services, hardware and segment exports (Brazilian Association of Software Companies [Associação Brasileira das Empresas de Software] 2020). Despite this important growth in the sector, in Brazil, there is an urge for the information technology industry to accelerate the pace of diffusion of new technologies and the intensification of innovation – still considered underdeveloped. Such urge is due to the increased risk of a technological gap in the Brazilian industry and international insertion's consequent difficulty. As a result, actions proposed by the government, such as public financing, the establishment of international partnerships, and partnerships with universities, among others (Institute for Industrial Development Studies [Instituto de Estudos Para o Desenvolvimento Industrial] 2017), are vital. The same is true regarding the private sector's support – the Brazilian information technology companies -, which is crucial to boost research and learning actions within their environments, fostering innovation spaces within the Brazilian scenario, motivating the focus of the study in this sector.

Considering the IT sector itself, these rapid market changes are requiring constant adaptation and knowledge development by companies and professionals. The need to adapt to a new skill set, the discontinuity of functions, and the emergence of new work positions are some of the impacts of Industry 4.0 (Baruch, Szűcs, and Gunz 2015; Baruch and Vardi 2016).

As far as technology professionals are concerned, their technical skills need to keep pace with rapid evolution, in addition to develop skills they did not learn in their formal education, and the multidisciplinary knowledge is increasingly valued, allowing them to focus on new ways of working (Reis and Hasan 2018).

With regard to IT companies, continuous learning becomes more valued and will become necessary as part of the culture of these organizations that, in order to remain competitive in this context, must develop and maintain their talents. The capability of organizations, teams, and individuals to continuously learn and transform themselves, may result in behavioural shifts that underpin performance results, allowing them to effectively sustain innovation, and provides a more precise understanding and more in-depth knowledge directly linked with organizational culture and environment (Tortorella, Cawley Vergarab, Garza-Reyesc and Sawhneyd 2020), motivating research on organizational learning culture.

Along with that, the results obtained by contemporary organizations depend on how engaged their employees are with work activities. That is because they demand that professionals do not restrict themselves only to operational and manual activities and become able to invest psychologically in their work in a healthy way (Shaufeli 2018), making it essential to understand these professionals and their work engagement . Lastly,

another challenge emerges for companies in this sector: finding IT professionals – seen as human capital and critical players in the evolution of Industry 4.0 – and keeping them within organizations. This challenge is due to the scarcity of IT talents compared to the accelerated growth of the sector's demands, which can be understood as a problem at a global level, given that currently many companies operate on this scale, in addition to the mobility of these professionals in different countries. This phenomenon is increasingly recurrent, generating the search for an understanding of the turnover intention of professionals in this segment.

In these circumstances, the role of the HRD becomes even more relevant, since one of its primary functions is to provide professional education, learning, and training of individuals and teams, actions that can significantly impact the development and the performance of a company (Rana and Sharma 2019). Previous studies have demonstrated that creating and encouraging organizational learning culture is key to ensure a satisfied, engaged, committed, healthy, and stable workforce in the long term, which can, in turn, yield different positive work outcomes (Hanaysha 2016). Considering the scenario presented, this study aims to look into Information Technology companies based in Brazil and verify whether there is a relationship between the organizational learning culture, work engagement, and turnover intention. We believe that the main contributions of this study to an international audience are: 1) we did not identify, in our literature review, studies that involved the entire set of variables investigated; 2) although there is evidence about the relationships between the variables investigated separately in international studies, bringing evidence about them in a new context can contribute to the replicability of the findings already available, in addition to presenting new results, relevant to the theory and research on learning organizations (Köhler and Cortina 2021); 3) currently many companies in the sector operate on a global scale, making observations transferable across organizations and cultures; 4) increasing mobility of professionals who make frequent transitions between companies and even countries (Gupta 2020). A recent PwC global survey on mobility (PwC 2018) points to the importance of how to keep pace and deliver solid results in this changing environment. It also means that organizations must seek innovative ways to retain, attract and employ talent in a global and competitive market, reason that makes relevant the contributions that studies with these professionals can generate in the most different cultural contexts. Below, we will present the main variables of this study and the hypotheses related to them.

### ***Organizational Learning Culture***

According to the 2019 Deloitte Global Human Capital Trends report, 86% of the 10,000 respondents in 119 countries understand that they need to reinvent their learning skills. The study also showed that the main reason for professionals to leave their companies is the impossibility of learning and growing; and that the leaders who responded to the survey admitted to perceiving more chances of growth for their collaborators outside the organization than for the ones inside it (Volini et al. 2019).

In the field of Organizational Learning (OL), the concept of Organizational Culture (OC) is inseparable, as the nature and learning processes can vary according to cultural contexts and the objective of what is learned (Fiol and Lyles 1985). Hofstede (2002)

points out that OC only makes sense in a collective and not individually, but that the effects of a culture on the individual make sense. Schein (1992) understood that the culture of a group is the result of the social experience shared by its members. Thus, as a group develops a model of basic assumptions in the learning process to deal with problems, and if these assumptions prove to be valid, they are taught to other members of the organization as the right way to perceive and feel about those problems. Silva, Godoy, and Hanashiro (2013) state that the relationship between OC and OL occurs in two ways, with culture being incorporated into a process of permanent learning within the organizational context, or still, culture being able to place itself as a facilitator or as a barrier to learning within a given organizational context. Thus, the understanding of cultural factors and organizational learning processes are relevant themes in the current scenario, given that, with the rapid contextual changes, companies need to seek strategies to improve performance, competitiveness, and sustainable survival (World Economic Forum 2019).

The process by which the acquisition of knowledge and understanding of reality allows for an improvement in organizational action can be understood as Organizational Learning (Fiol and Lyles 1985). This field of study also brings some theories related to the concept of Learning Organizations (LO) (Senge 1990; Watkins and Marsick 1993), which emphasize the process of continuous creation and improvement of the organizations' learning capacity through a culture that provide learning (Tsang 1997).

According to the model proposed by Watkins and Marsick (1997), an LO is characterized by the construction of a continuous transformation of an organization and its culture, in order to facilitate organizational learning processes (Marsick and Watkins 2003). These are social processes of shared discovering and gradually reinforced experiences, beliefs, values, and premises (Sidani and Reese 2018), which can be understood as learning opportunities or organizational learning interventions that aim to facilitate learning in the work environment (Gil and Mataveli 2017).

The authors proposed the Dimensions of the Learning Organization – DLOQ (Watkins and Marsick 1997) tool, which has a Brazilian version validated by Urrutia-Pereira (2020). The organizational learning culture is represented by seven dimensions in the DLOQ, understood as the necessary capacities for organizations to be able to continuously learn and transform themselves: (1) creating continuous learning opportunities; (2) promoting inquiry and dialogue; (3) encouraging collaboration and team learning; (4) creating systems to capture and share learning; (5) empowering people towards a collective vision; (6) connecting the organization to its environment; (7) providing strategic leadership for learning. Many of the technological advancement needs required to advance Industry 4.0 are discovered through research and development within companies and IT sectors themselves, through trial and error. This makes understanding these learning capabilities in organizations so relevant. The details of each one will be seen in the instrument section of this article.

The study by Bhuvanaiah and Raya (2016) with IT professionals found that culture was a significant determinant of work engagement, mainly considering employees' values as a mean to set standards for maintaining supportive culture. Having in mind that work engagement is a dynamic process that can be changed by labour conditions, understanding its relationship with the various variables that affect it is of utmost importance in order to manage it, as well as the organizational results related to it.

## **Work engagement**

With an increasing deficit of qualified professionals, the dispute at the global level for IT professionals makes the human capital management of this sector increasingly strategic for organizational success. [Shaufeli \(2018\)](#) argues that this rapid and continuous process of changes in the working world has required substantial psychological adaptation and involvement on the part of professionals. They need psychological skills to thrive and to make the organization survive. Organizational change requires people to adapt; an environment focused on diversity requires new perspectives to be provided, resulting in the growth of the human capital importance and the workers' psychological involvement in business, as is the case when observing engagement in the workplace.

Despite the popularization of the concept of work engagement within organizations and consultancy firms, and the proliferation of studies on the subject, there is some confusion regarding its use ([Shuck and Wollard 2009](#)). In this study, work engagement will be defined as a desirable condition, of a cognitive-affective nature, that connects the individual with his or her job, providing feelings of well-being and satisfaction ([Shaufeli 2018](#); [Vazquez et al. 2015](#)), and being linked to elevated feelings of inspiration and pleasure for what is produced professionally ([Magnan et al. 2016](#)). In the literature, there are different theoretical models on work engagement and, for the purposes of this study, we used the approach of the theoretical model of job demands and resources (JD-R), as it is the one with the most robust empirical foundation, according to [Shaufeli \(2018\)](#).

The JD-R model proposes that work engagement is the result of the motivational nature of resources, which can be of two types: (1) Work resources are understood as functional labour aspects to achieve work goals that can reduce work demands as well as stimulate personal growth and development; (2) Personal resources are the psychological characteristics linked to resilience and related to the ability to positively control the impact of workers in their work environment, enabling them to persist and maintain the focus on their efforts ([Schaufeli and Taris 2014](#)).

Work demands are related to the negative process of health harm, being the work aspects that require physical and mental effort. When demands are high, extra efforts are necessary, and when recovery is not enough, workers can gradually lose their energy, and even go into a burnout process. It is worth noting that there may be a cross between the processes, for example: scarce resources or demands that are understood as challenging ([Shaufeli 2018](#)).

According to [Schaufeli et al. \(2002\)](#), engagement can be characterized by: vigour, dedication, and absorption. Vigour refers to high levels of energy and mental resilience during work, the willingness to invest effort and persistence even in the face of difficulties. Dedication is associated with a sense of meaning, enthusiasm, inspiration, pride, and challenge at work. Finally, absorption refers to a state of total concentration, happiness, and immersion in work, in which time passes quickly and it is difficult to disconnect completely ([Salanova, Agut, and Peiró 2005](#); [Schaufeli and Bakker 2003](#)). The model proposes that work engagement should be measured with a specific instrument and analysed from the perspective of a balance between potential protective (resources) and risk (demands) factors to the well-being, performance, and health of the worker ([Schaufeli et al. 2002](#)).

Cavalcante, Siqueira, and Kuniyoshi (2014), in a study that aimed to investigate work engagement, well-being, and psychological capital in people management professionals, observed that work engagement has a correlation with well-being at work. Bakker and Leiter (2010) argue that work engagement is a positive aspect, also related to well-being, and point out that engaged employees have high levels of energy and strong identification with their own job. Another study, also with IT professionals, demonstrated that work engagement mediated the relationship between adjustment to the role at work and the availability of personal resources (Diedericks and Rothmann 2013).

### **Turnover intention**

*Intention* can be understood as a person's decision to act and the effort they are willing to make to perform a behaviour (Abraham and Sheeran 2003), being able to predict between 20% and 30% of the behaviour variation in different domains (Sheeran 2002). *Turnover intention* refers to an individuals' conscious cognitive process about voluntarily leaving the organization in the near future, being the last cognitive element before the person's final decision to actually leave the organization (Mowday, Porter, and Steers 1982).

A high turnover rate is an indicator of possible losses to the organization, such as loss of knowledge, gaps in the production process, time and cost of replacing staff, investment in training for the new workers who will be inserted in the process (Pinheiro 2013). The costs resulting from voluntary turnover can vary from 93% to 200% of the annual salary for a single position, these impacts being a source of concern and discussion in the organizational context (Oliveira et al. 2019).

According to Hom and Griffeth (1991), exit cognitions and job search behaviour have direct effects on turnover behaviour over time, considering: a) Preparatory job search behaviour: efforts that the individual gathers to produce information about job offers; b) Active behaviour in the search for a new job: when the individual concretely starts his or her job search, contacting other organizations, looking for new positions through their contact network in order to achieve their work placement; c) Intensity of job search: time dedicated to exploring different options and to considering possible futures and d) Self-efficacy in job search: the individual's belief that they can successfully perform specific job search behaviours (Saks, Zikic, and Koen 2015; Koen et al. 2016).

IT professionals are recognized as human capital, with a direct impact on organizational performance. When a professional, especially a highly qualified professional, quits, there is a loss of accumulated knowledge, direct impacts on production, and a loss of investment made in the professional who is leaving (Vidotto, Bentancourt and Bastos 2016).

### **Hypothesis**

Considering the above about learning organizational culture, the first hypothesis of this study proposes that a culture of organizational learning perceived as a facilitator will be a positive predictor of work engagement levels (H1). Since in the present study, we sought to understand whether the balance between potential resources and demands that lead to work engagement interfere in a positive way, that is, reducing the professionals'

intention to leave the organization, our second hypothesis suggests that work engagement will be a negative predictor of turnover intention (H2). Finally, we argue that understanding what factors are related to one's intention to leave the organization (Ahuja et al. 2007; Maier et al. 2015) can help in the process of looking for ways to keep these professionals (Hofaidhllaoui and Chhinzer 2014; Guevara and Bounfour 2013; Steil, Penha, and Bonilla 2016). Therefore, our third hypothesis states that an organizational learning culture perceived as a facilitator will be a negative predictor of the turnover intention (TI) (H3).

## Method

### Participants

The sample of this study comprised five small and medium-sized companies in the Information Technology segment based in Brazil, selected for convenience, identified by personal contact and network of the authors. Companies that consented to participate within the precise period in the research project schedule were included in the study, resulting in a sufficient sample to carry out the analyzes proposed in the study. Among the 14 companies contacted: 7 did not respond to the contacts, 2 did not obtain internal approval for participation and 5 agreed to take part in the study. The inclusion criteria for the participants were: being over 18 years old, working in one of the organizations participating in the research, and providing their written consent. Respondents were from three Brazilian states (RS, PR, and SP). The sample composition of this study was of 188 individuals. Of these, 41.5% (n = 78) reported being males, 39.9% (n = 75) reported being females, and 18.6% (n = 35) reported being gender neutral. The average age was 33.7 years old (SD = 8.74), with a minimum age of 19 years old and a maximum of 62 years old.

### Instruments

A survey-type questionnaire was made available online on the Qualtrics platform. The instrument consisted of a sociodemographic and labour questionnaire, the Dimensions of the Learning Organization Questionnaire, the Utrecht Work Engagement Scale, and the Turnover Intention and Job Search Scale. Each of the instruments is described below:

*Sociodemographic and labour questionnaire:* This instrument aimed to collect socio-demographic data of the respondents (age, gender with which they identify, state, company time, functional level, educational level, workload, among others).

*Dimensions of the Learning Organization Questionnaire – DLOQ:* It is a questionnaire proposed by Watkins and Marsick (1997), which aims to measure organizational learning culture. The instrument was validated in Brazil by Urrutia-Pereira (2020) and has 46 items on learning culture, being scored using a six-point Likert scale, ranging from (1) *almost never* to (6) *almost always*. The questionnaire consists of seven dimensions of culture for organizational learning:

(1) Creating continuous learning opportunities ( $\alpha = 0.87$ ): Refers to the possibility of learning on the job; and opportunities are provided for ongoing education and growth. – *Example item: 'In my organization, people help each other to learn.'*



(2) Promoting inquiry and dialogue ( $\alpha = 0.91$ ): People express their views and listen and inquire into the views of others. There is support for questioning, feedback, and experimentation. – *Example item: ‘In my organization, people are encouraged to ask “why”, regardless of their position.’;*

(3) Encouraging collaboration and team learning ( $\alpha = 0.91$ ): Work is designed to use groups to access different modes of thinking; collaboration is valued and rewarded – *Item example: ‘In my organization, teams are rewarded for their achievements as a group.’;*

(4) To create systems to capture and share learning ( $\alpha = 0.88$ ): Technological systems to share learning are created and integrated with work; access is provided; systems are maintained. – *Example item: ‘My organization measures the results of time and resources that are spent on training.’;*

(5) Empowering people towards a collective vision ( $\alpha = 0.92$ ): People are involved in setting, owning, and implementing a joint vision; responsibility is distributed close to decision making, so that people are motivated to understand the cause-effect relationship. – *Example item: ‘My organization invites people to contribute to the organization’s vision.’;*

(6) Connecting the organization to its environment ( $\alpha = 0.89$ ): People are helped to see the effect of their work on the entire enterprise and to think systemically. The organization is linked to its communities in several ways. – *Example item: ‘My organization encourages everyone to bring customer insights into the decision-making process.’;*

(7) Providing strategic leadership for learning ( $\alpha = 0.94$ ): Leaders model and support learning, using learning strategically for business results. – *Example item: ‘In my organization, the leaders often support requests for learning and training opportunities’.*

*Utrecht Work Engagement Scale (UWES –9)*. A scale proposed to measure positive and healthy work outcomes, evaluating Work Engagement (WE). The instrument is, internationally, the most widely used for the evaluation of WE; it was adapted and validated for Brazil (Vazquez et al. 2015), and obtained adequate, and indicated for use, internal consistency ( $\alpha = 0.95$ ). The full version of the instrument is composed of three factors: (1) Vigour, represented, for example, by the item ‘*In my work, I feel that I am full of energy.*’ (2) Dedication, represented, for example, by the item ‘*I am enthusiastic about my work.*’ and (3) Absorption, represented, for example, by the item ‘*I feel happy when I am intensely involved in work.*’. The reduced version has nine items, with the option of being used as a one-dimensional measure. In both versions, items are scored using a seven-point Likert scale, ranging from (0) *Never* to (6) *Always*.

*Turnover Intention and Job Search Scale-TIJSS*. Adapted to Brazil by Silva et al. (2018), this scale evaluates intentions and behaviours of turnover. The TIJSS was originally composed of 10 items that constitute four dimensions: (a) Intention to quit the current job is represented, for example, by the item ‘*What are the chances of you leaving this organization in the next 12 months?*’; (b) Intention to search for new job opportunities is represented, for example, by the item ‘*During the next months I intend to look for another occupation*’; (c) Reflections on quitting the current job are represented, for example, by the item ‘*I intend to resign from my current job.*’ (d) Job search behaviour is represented, for example, by the item ‘*I have been looking for other jobs since I joined this organization*’. Answers are provided using a 5-point Likert scale, ranging from (1) *No chance* to (5) *100% chance*. The composite reliability was greater than 0.92.

## Procedures

Data collection took place between September and October 2019. It was an online procedure, with the consent of the companies surveyed and their participants. The average application time was 15 minutes. All research activities followed the conditions established in Resolution 510/2016 of the *Conselho Nacional de Saúde* (CNS, National Health Council 2016) and were approved by the Scientific Committee and Research Ethics Committee of the *Pontifícia Universidade Católica do Rio Grande do Sul* (PUCRS – Pontifical Catholic University of Rio Grande do Sul) (CAAE: 3.319.371).

## Data analysis

Demographic data and the relationships between the learning culture, work engagement, and turnover intention variables were analysed with the aid of the R statistical software. Descriptive statistical analysis was performed, calculating the frequency, percentage, average, and standard deviation of the variables. Subsequently, an abductive approach was used, first with the bivariate correlation analysis, to investigate the relationship between the independent variable (learning culture) and dependent variables (work engagement and turnover intention). Finally, a network analysis was conducted (Borsboom and Cramer 2013) using the qgraph package (Epskamp et al. 2012), which is a machine learning technique to create data-driven, multivariate models. In this model, a parsimonious solution is reached by the means of regularized partial correlations (i.e. conditional associations) and penalization is applied fixing in zero small partial coefficients. In this way, only the strongest, theoretically relevant, partial correlations were maintained, represented in a two-dimensional graphical object, formed by vertices (variables) and edges (relations). The disposition of the variables is defined so that the intensity of the edges of the graph represents the magnitude of these associations, while its pattern represents the direction (negative or positive) of the associations. The graph also has the application of a positioning algorithm that causes the variables to be approximated or expelled according to their association. The more central the variable is, the greater the number of associations with the others (Borsboom and Cramer 2013; Machado, Vissoci, and Epskamp 2015). Network analysis also provides standard goodness-of-fit indices of the network model as presented in structural equation modelling literature. The indices and their respective cut-off criteria are the Comparative Fit Index ( $CFI \geq .95$ ), the Tucker Lewis Fit Index ( $TLI \geq .95$ ), and the Root Mean Square Error of Approximation ( $RMSEA \leq .06$  or  $.08$  with 90% confidence interval) (Irwing, Booth, and Hughes 2018). Network analysis is a method congruent with an abductive approach, which initiates with a data pattern observation in a freely way, that is, just the opposite of the theoretical-driven way of hypothetic-deductive approach.

In addition to estimating partial correlations and generating the network graph of these associations, descriptive measures were useful to identify the most influential variables in this system. The closeness measure indicates the inverse of the distance of one variable in relation to the others, representing its general degree of association (Borgatti 2005). The expected influence measure, in turn, was obtained by adding the first- and second-degree edges of each variable, representing how influential the variable is, once it is activated (Robinaugh, Millner, and McNally 2016).

## Results

### Descriptive analysis

The descriptive analysis of each dimension of the administered instruments are presented in Table 1. Regarding the learning culture dimensions, we can see that six out of the seven culture dimensions had an average score above four points, which suggests that they are at the midpoint of the scale, being more inclined to a positive evaluation of the items. The CSCSL dimension – To create systems to capture and share learning, appears as an exception ( $M = 3.75$ ,  $SD = 1.11$ ), suggesting that it is a less present aspect in the investigated organizations. Still, the result suggests that they are, in general, being perceived as capable of favouring the learning aspects in their organizational culture.

It was also possible to observe that the participants have high averages of work engagement ( $M = 5.42$ ,  $SD = 0.96$ ) (Magnan et al. 2016). Regarding the turnover intention dimensions, the sample result indicates that the average intention to search for new work is lower than the theoretical average of the scale ( $M = 2.31$   $SD = 1.15$ ). The same occurs with the intention to quit the current job dimension ( $M = 2.20$ ,  $SD = 1.10$ ). The averages for reflections on quitting the current job ( $M = 1.54$ ;  $SD = 0.92$ ) and the job search behaviour ( $M = 1.60$ ;  $SD = 0.88$ ) were even lower. It is important to note that the permanence or departure from organizations starts with the dissatisfaction and the intention to quit the job. Such feeling leads the individual to think and plan the job exit (job exit cognitions), showing the intention to search for new job opportunities. The next step would be to actively search for new job opportunities (Silva et al. 2018). The observed results indicate that, in the sample, there are professionals in different stages of this voluntary turnover cycle.

It is important to note that in the sociodemographic questionnaire there were three statements about the importance of learning for the participant. Most participants (99.52%) informed that they believe it is important for their professional accomplishment that the work environment provides learning experiences; 92.79% realized that the company they worked for at the time of data collection provided new learning; and

**Table 1.** Descriptive analysis of the dimensions of the instruments used.

	Mean	SD	Median	Minimum	Maximum
<b>CCLO</b>	4.21	0.91	4.29	1.43	6.00
<b>PID</b>	4.15	1.05	4.17	1.00	6.00
<b>ECTL</b>	4.42	0.97	4.43	1.14	6.00
<b>CSCSL</b>	3.75	1.11	3.67	1.00	6.00
<b>EPTCV</b>	4.03	1.12	4.00	1.00	6.00
<b>COE</b>	4.19	0.99	4.25	1.25	6.00
<b>PSLL</b>	4.06	1.18	4.17	1.00	6.00
<b>WE</b>	5.42	0.96	5.56	1.22	7.00
<b>ILFNPO</b>	2.31	1.15	2.00	1.00	5.00
<b>ILCJ</b>	2.20	1.10	2.00	1.00	5.00
<b>RQCJ</b>	1.54	0.92	1.00	1.00	5.00
<b>JSB</b>	1.60	0.88	1.33	1.00	5.00

Key: CCLO = Creating Continuous Learning Opportunities; PID = Promoting Inquiry and Dialogue; ECTL = Encouraging Collaboration and Team Learning; CSCSL = Creating Systems to Capture and Share Learning; EPTCV = Empowering People Towards a Collective Vision; COE = Connecting the Organization to its Environment; PSLL = Providing Strategic Leadership for Learning; WE = Work engagement; ILFNPO = Intention to Look For a New Professional Opportunity; ILCJ = Intention to Leave the Current Job; RQCJ = Reflections on Quitting the Current Job; JSB = Job Search Behaviour.

81.88% understood that their leader contributed to promote a culture that facilitates learning. These numbers indicate that, in the five IT companies in this study, there is a significant percentage of professionals who value a work environment that enables learning.

### **Analysis of bivariate correlations**

A heat graph that represents the correlations is presented in Table 2. The more intense the colour of the field, the stronger the correlation between the variables. It was observed that the bivariate correlations were high (above .7) and positive between the dimensions: Creating Continuous Learning Opportunities (CCLO) and Promoting Inquiry and Dialogue (PID); between Promoting Inquiry and Dialogue (PID) and Encouraging Collaboration and Team Learning (ECTL); and, finally, between Empowering People Towards a Collective Vision (EPTCV) and Encouraging Collaboration and Team Learning (ECTL).

Creating Systems to Capture and Share Learning (CSCSL) showed a high correlation with Empowering People Towards a Collective Vision (EPTCV) and Providing Strategic Leadership for Learning (PSLL); Empowering People Towards a Collective Vision (EPTCV) and Providing Strategic Leadership for Learning (PSLL) also have a high correlation with each other. In addition, Connecting the Organization to its Environment (COE) had a high correlation with Empowering People Towards a Collective Vision (EPTCV) and Providing Strategic Leadership for Learning (PSLL). The other correlations between the culture dimensions were moderate (from .5 to .7) in this sample.

A learning culture dimension showed a moderate correlation with Work Engagement (WE) – Connecting the Organization to its Environment (COE), indicating that corporate actions aimed at this dimension tend to affect work engagement positively. The other correlations between culture and engagement were considered small (up to .5). The analysis of the turnover intention indicated that Work Engagement (WE) also had a small correlation with the intention to quit the job (IQJ), the Reflections on searching (RSJ) and the active Job search behaviour (JSB) variables.

**Table 2.** Bivariate correlations between the investigated dimensions.

	CCLO	PID	ECTL	CSCSL	EPTCV	COE	PSLL	WE	ILCJ	RQCJ	JSB
<b>CCLO</b>	1.00	0.79	0.73	0.63	0.70	0.72	0.74	0.46	-0.39	-0.34	-0.36
<b>PID</b>	0.79	1.00	0.80	0.66	0.73	0.70	0.69	0.42	-0.40	-0.38	-0.36
<b>ECTL</b>	0.73	0.80	1.00	0.69	0.78	0.72	0.72	0.49	-0.39	-0.39	-0.36
<b>CSCSL</b>	0.63	0.66	0.69	1.00	0.79	0.68	0.77	0.42	-0.32	-0.37	-0.29
<b>EPTCV</b>	0.70	0.73	0.78	0.79	1.00	0.78	0.80	0.45	-0.37	-0.36	-0.34
<b>COE</b>	0.72	0.70	0.72	0.68	0.78	1.00	0.79	0.52	-0.42	-0.36	-0.33
<b>PSLL</b>	0.74	0.69	0.72	0.77	0.80	0.79	1.00	0.47	-0.40	-0.37	-0.36
<b>WE</b>	0.46	0.42	0.49	0.42	0.45	0.52	0.47	1.00	-0.47	-0.44	-0.38
<b>ILCJ</b>	-0.39	-0.40	-0.39	-0.32	-0.37	-0.42	-0.40	-0.47	1.00	0.73	0.69
<b>RQCJ</b>	-0.34	-0.38	-0.39	-0.37	-0.36	-0.36	-0.37	-0.44	0.73	1.00	0.67
<b>JSB</b>	-0.36	-0.36	-0.36	-0.29	-0.34	-0.33	-0.36	-0.38	0.69	0.67	1.00

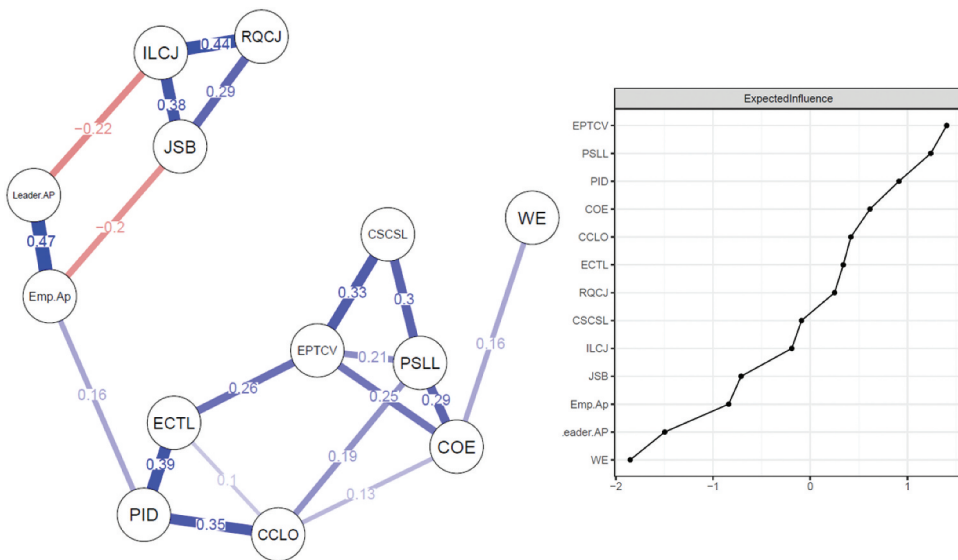
Key: CCLO = Creating Continuous Learning Opportunities; PID = Promoting Inquiry and Dialogue; ECTL = Encouraging Collaboration and Team Learning; CSCSL = Creating Systems to Capture and Share Learning; EPTCV = Empowering People Towards a Collective Vision; COE = Connecting the Organization to its Environment; PSLL = Providing Strategic Leadership for Learning; WE = Work engagement; ILCJ = Intention to Leave the Current Job; RQCJ = Reflections on Quitting the Current Job; JSB = Job Search Behaviour.

Still, considering the turnover intention, there was a moderate correlation between the intention to quit the job (IQJ) and Reflections on job search (RJS) variables; Intention to quit the job (IQJ) and Job search behaviour (JSB); and between Reflections on searching (RSJ) and Job search behaviour (JSB). In addition, weak correlations were observed between these variables and the learning culture dimensions.

A relevant fact to be mentioned is that there was an extremely high correlation between the intention to search for a job (ISJ) and intention to quit the job (IQJ) dimensions – above .90. To avoid multicollinearity effects in this sample, the intention to search for a job (ISJ) dimension was isolated from the analysis.

### Network Analysis

The partial correlations, that is, pairwise correlations after the effects of the other variables and their respective dimensions investigated are controlled, are graphically represented in Figure 1. The model had an excellent fit to the data, as goodness-of-fit indices show the following values: Chi-square (59) = 229.01, CFI = .95, TLI = .93, RMSEA = .067 (90% Confidence interval = .058/.082). In comparison with the bivariate correlations (Table 2), it is noticed that the network maintains on this representation



**Figure 1.** Network analysis Key: CCLO = Creating Continuous Learning Opportunities; PID = Promoting Inquiry and Dialogue; ECTL = Encouraging Collaboration and Team Learning; CSCSL = Creating Systems to Capture and Share Learning; EPTCV = Empowering People Towards a Collective Vision; COE = Connecting the Organization to its Environment; PSLL = Providing Strategic Leadership for Learning; WE = Work engagement; RQCJ = Reflections on Quitting the Current Job; JSB = Job Search Behaviour; ILCJ = Intention to Leave the Current Job. Emp.Ap = The company I work for creates learning opportunities; Leader.Ap = I believe that my leader contributes to promoting a culture that facilitates learning.

only those more stable associations. In [Figure 1](#), the measures of partial correlations are presented, referring to the dimensions of organizational learning culture, work engagement, and turnover intention in the evaluated sample.

It is possible to observe that the Promoting Inquiry and Dialogue (PID) and Encouraging Collaboration and Team Learning (ECTL) dimensions are those with more closeness, which means that there is a strong influence between both. In other words, when there is an organizational environment that supports questioning and feedback, there is a positive relationship with collaboration and the possibility of building different ways of thinking, with team learning being valued and rewarded. Creating Continuous Learning Opportunities (CCLO) and Promoting Inquiry and Dialogue (PID) are also the dimensions with more expected influence also showing that a space for dialogue is related to the learning projected in the tasks, through which people can learn continuously while working.

On the other hand, Empowering People Towards a Collective Vision (EPTCV) has a higher level of expected influence, that is, it has a greater capacity to influence the state of the other dimensions when it is present. This means that the more people are involved in the definition, possession, and implementation of visions, also perceiving themselves as being responsible and connected to decision making, the greater the possibility of this involvement influencing the state of the other dimensions related to it.

It is observed that organizational actions directed to the Connecting the Organization to its Environment (COE) dimension, have a direct effect on Work Engagement (WE), that is, actions oriented to this dimension tend to bring positive results to the work engagement of the employees. The Intention to quit the job and the Reflection on job search, as well as the Intention to quit the job and the Job search behaviour, have a moderate relationship with each other, which allows to conclude that when there is a conscious cognitive process about leaving the organization, there is a greater tendency to conclude it in behaviour, with regard to this sample.

Finally, the network analysis still shows that there is a moderate correlation between the perception of how much the leader foments learning and how much the company provides learning. This highlights the understanding that the figure of the leader represents the actions of the organization. Still, the perception of the professionals that the company provides learning also showed a negative correlation, although a small one, in relation to the turnover intention and turnover behaviour dimensions, that is, for this sample, the current leadership and company promoting learning are points taken into consideration by the professionals in order for them to stay in the organization.

## Discussion

This study aimed to analyse companies, based in Brazil, in the Information Technology segment, in order to investigate their culture of organizational learning, analysing whether there is a relationship between the learning culture, work engagement, and turnover intention of their workers. For that, as a backdrop, Industry 4.0 and all the changes involved in this new paradigm were brought together.

At the beginning of this study, we presented the hypothesis that an organizational learning culture perceived as a facilitator would be a positive predictor of work engagement levels (H1). The instrument used to evaluate the learning culture addresses seven

dimensions (Marsick and Watkins 2003), of which only one showed a direct relationship with work engagement: Connecting the Organization to its Environment (COE). Therefore, it is possible to say that H1 was partially confirmed (since just one out of the seven dimensions evaluated had a significant result). Given that, in addition to this dimension having obtained a moderate correlation, the descriptive result was evaluated as positive in the study, influencing work engagement.

These results are in line with those observed by Bhuvanaiah and Raya (2016), in a study carried out in India with 100 IT professionals, in which they mention that in order to ensure sustainable engagement levels, it is necessary to have a constructive organizational culture. According to the authors, maintaining such culture would generate a positive energy that helps employees to willingly contribute to achieve work objectives. In other words, organizational culture can contribute to generate resources considered appropriate and sufficient to handle the demands of the work. This might result in the perception that workers' needs are met (e.g. being encouraged to bring customer insights to the decision-making processes gives rise to a sense of autonomy, competence and relatedness), what intrinsically motivates them to exercise discretionary effort at work .

Hypothesis 2 (H2) suggested that engagement at work would be a negative predictor of turnover intention. The choice of the TIJSS instrument was, as mentioned, due to the instrument's ability to evaluate intention, reflection and exit behaviour (Silva et al. 2018). It is worth noting that the professionals in our sample had high levels of engagement, perceived that the organization offered relevant resources for learning (they had high average scores in the different dimensions of organizational learning culture), in addition to presenting low levels of turnover intention. Although the job and organizational design literature shows that job resources may instigate a motivational process leading to job-related learning, work engagement and organizational commitment and a propensity to stay in the organization (Hoonakker, Carayon and Korunka 2013), this relationship was not fully observed in the present study. Although at first this data may generate strangeness, it is necessary to remember that the investigated sample consists of IT professionals, and that the context in which they are inserted is that of Industry 4.0, characterized, among other aspects, by extremely heated markets. It is also important to highlight that work engagement concerns the engagement of professionals with what they produce, and not with the organization *per se* (Shaufeli 2018). Thus, it is possible to consider that a professional with a high level of engagement tends to be constantly evaluating opportunities for development, learning, and growth in their career (a better balance between job demands and organizational and personal resources), considering for that, not only different aspects of the organization where he or she is, but also including the evaluation of opportunities in other locations if they show a better alternative than the one currently experienced. Thus, in the sample evaluated, being engaged to the job is not related to the lower or higher chance of leaving the organization. Therefore, we can say that H2 was not proven in this sample.

The third hypothesis (H3), in turn, stated that an organizational learning culture perceived as a facilitator would be a negative predictor of Turnover Intention (TI). Although the study allowed observing the indirect relationship between these variables, when only the most stable relationships were considered, they were not significant. Thus, it was also not possible to prove the H3 hypothesis in this study.

Maier et al. (2015) also studied results regarding the turnover intention in professionals in this segment in a longitudinal study in which 91, among the 125 IT professionals participating, reported a high level of intention to leave, although only 27 reported active search behaviour in the last 12 months. In the case of the sample of this study, on the other hand, this relationship between cognition and intention to leave the company behaviour was considered moderate.

Previous studies with diverse samples carried out in the Brazilian context (Oliveira et al. 2019) indicated that the reasons for the intention to leave the organization differ from those that effectively cause professionals to leave. Furthermore, they show that organizations have greater influence on the reasons that lead professionals to remain than to withdraw from them (the reasons for leaving refer mainly to contextual and individual aspects, while those for remaining refer to organizational aspects). In the present study, dimensions of the learning culture were investigated as antecedents of the intention to turnover. Considering that such dimensions can be understood as resources offered by the organization to carry out the work, it is understandable that the results are mainly related to work engagement (which depends on an adequate balance between demands and resources).

Taken together, the findings of this study provide support for reflections about future actions in the corporate world. Considering the 21st century, and more specifically the Industry 4.0 context, different forms of work are required, increasingly demanding the development of skills that go beyond techniques, such as collaboration, solving complex problems, opening up to new ideas, empathy, protagonism, and entrepreneurial capacity (De Fruyt, Wille, and John 2015). In IT companies, these skills are highly necessary, given that many technological developments are discovered through research and development within the companies themselves, through trial and error. For this reason, understanding the cultural aspects that are acting as barriers or facilitators of organizational learning becomes such a relevant topic, as well as the other correlations observed in this study.

Although presenting such relevant findings, the fact that this study was carried out with a relatively small sample can be seen as a limitation. Even so, it is important to highlight that it was possible to achieve the objective of approaching more than one organization in the sample plan, which is a positive aspect. However, most participants were from the state of Rio Grande do Sul (82.9%), which compromises data generalization. The usage of convenience sampling to recruit sample in the research could also be a limitation considering it has disadvantages especially in reducing the representativeness of the sample and the generalizability of the results to the population of study. Finally, in addition to other limitations, it is important to emphasize that the data in this study were collected before the COVID-19 pandemic. Therefore, future studies could bring relevant contributions by presenting the impacts of the pandemic and the strategies adopted by the Brazilian government in relation to work and employment during this period on the engagement and turnover intention of professionals in the country.

### **Implications for the Theory**

Regarding the implications for the theory concerning the field of HRD, this study allowed researchers to observe the performance of the DLOQ in a different cultural context, that of IT professionals in an underdeveloped IT industry. They also provide more



information about the relationships between organizational learning culture, work engagement, and turnover intention. From the results, it is understandable that actions linked to connecting the organization to its environment (DLOQ's dimension) would impact work engagement. This dimension is about people realizing the impact of their work on the organization and beyond it. Considering that it includes several items, a strategy for the practical use of these results would be to identify how each of the items that compose it are expressed in the organizations' routine and prioritize which of them can be worked in the company. For example, one of the items in this dimension is: 'My organization considers the impact of its decisions on employee motivation'. From this item, it is possible to develop and promote actions that take into account employees' motivations in decision-making processes and pay attention to the different ways of communicating the importance of this participation among employees from different hierarchical levels and sectors. Alternatively, still, considering the 'My organization provides conditions for employees to balance work and family' item, it would be relevant to look for flexible hours-strategies, home-office work arrangements, or to evaluate the possibility of allowing workers to take their children to work, actions increasingly practiced in several companies. This exercise can be done as an action plan for each of the several correlations found in the study, according to the priorities and values of each organization.

The results also provide an interesting theoretical reflection on the relationship between work engagement and turnover. The fact that the results indicated no correlation between these variables in our sample does not indicate that it is no longer critical to keep professionals in the organization. On the contrary, in a market context where there is a range of opportunities often providing these professionals with the benefit of being able to 'choose' where to work, it becomes even more important to design strategies linked to the other aspects that are significant to them, so that they individually see the reason for staying in the organization. An example is the result of this study, which indicates that when a high number of professionals say they perceive both the company and the leader fostering learning, it is possible to observe a reduction in the intention to search for a new job and leave behaviour.

Although our study was based on the theory of demands and work resources to understand the relationship between organizational learning, work engagement and turnover intentions, the tested model did not include variables related to work demands. It is possible that the lack of relationship between the intention of turnover and the other variables of interest to the study is due to this. The literature reviews on employee turnover, in agreement with the JD-R model, argue that stress/burnout on one hand and job satisfaction/commitment on the other hand are good predictors of turnover and turnover intention. More specifically, while the job and organizational design literature has shown that job demands (such as workload) and role stressors (such as role ambiguity, lack of challenge, task repetitiveness, and routinization) are positively related to turnover, it shows that job resources (such as decision latitude, social support, and Person-Organization fit) may instigate a motivational process and propensity to stay in the organization (Hoonakker, Carayon, and Korunk). Thus, although it suggests that organizational learning culture, and especially its Connecting the Organization to its Environment (COE) dimension, can contribute to generate job resources, which may be related to engagement, it was not able to provide similar information on turnover

intention. Thus, future studies could bring relevant information to the area by showing whether there is and how the relationship between organizational learning culture and work demands in the information technology area occurs.

## Implications for Practice

Regarding the practical contributions and implications concerning the field of HRD, the presented results bring several contributions. The first one concerns the possibility of knowing and understanding aspects of the organizational culture related to learning. The sense of how the organization has perceived the facilitating aspects or barriers to learning makes it possible to outline strategies aligned with its positioning in the market. The second contribution to organizational practices concerns the possibility of relating the different learning culture and work engagement dimensions, helping to prioritize strategies that may have a direct impact on work engagement levels. Given the high level of competition for professionals globally, understanding the relationships between the variables investigated in the present study becomes a competitive differential both in retaining talent in the organization and to work on a global scale transferring this information between organizations and cultures. The third contribution of this study to organizational practices is to evidence that reflection and intention to leave behaviours are not related to work engagement, but that engagement is related to aspects of learning culture, in addition to almost all surveyed professionals pointing out that an environment that provides learning is important, suggesting the relevance of this discussion. Thus, the present study is concluded with the expectation that the presented findings will contribute to researchers in the area, consultants, managers, and professionals who work with people management, in understanding and identifying organizational aspects that must be prioritized in order to enable organizations to learn and ensure the development of their employees in the organizational day-to-day of Industry 4.0.

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