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Learning Needs Assessment at Work (LNA): Past, Present and Future

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Abstract

The aim of this study was to describe and discuss the scientific production on Learning Needs Assessment at work (LNA) in the last five decades (1970 – 2019) through a bibliometric study. Bibliometric and longitudinal reviews on LNA are virtually nonexistent. Therefore, little is known about how LNA knowledge was in the past, is in the present and can be in the future. A survey of scientific articles was conducted in eight globally indexed databases between 2007 and 2019. Only blind review peer journals were utilized. After the application of sample selection criteria, 282 articles were considered valid for analysis. The three quantitative analysis dimensions were demographical, methodological and theoretical, and they were measured by twenty categorical and descriptive variables. In sum, results show that there is a substantial increment in the number of papers on LNA published in the last decade around the world, especially in Africa. Methodologically, it can be said that the studies have made important advances, mainly when it comes to learning needs processes and measures improvements, but there is still an extensive research agenda. On the other hand, it seems that the LNA still have made little conceptual progress since the 1960s. The predominant use of the term "training needs" to refer to skills gaps at work needs to be discussed and reviewed. In the near future, studies need to further investigate innovative theories and methods on LNA, as the application of multilevel modeling, alignment of needs and context/organizational strategy, the use of learning taxonomies, among others.

Keywords: training needs; personnel management; training, development and education; corporate education; staff development

1. Introduction

Bibliometry is a method used to review, study and measure texts characteristics using mathematical and/or statistical indicators (El-Maamiry & Ghauri, 2013). Despite the various theories and methods available, one can say that bibliometric researches have two main uses nowadays: performance analysis and science mapping. The former is aimed to assess the quality and quantity of intellectual production of researchers and institutions, and the second aims to explore the characteristics, the structure and/or the dynamics of a scientific field (Zupic & Cater, 2014). In this sense, we can say that this study is a science mapper on the LNA field, because it aimed to describe and discuss the knowledge production on Learning Needs Assessment at work (LNA) in the last five decades (1971–2019) through a bibliometric study.

Recently in Management, bibliometrics methods have been used to characterize some fields like strategic management (e.g., Di Stefano, Verona, & Peteraf, 2010; Nerur, Rasheed, & Natarajan, 2008; Ramos-Rodriguez and Ruiz-Navarro, 2004), entrepreneurship (e.g., Gartner, Davidsson, & Zahra, 2006; Landström, Harirchi, & Aström, 2012; Schildt, Zahra, & Sillanpaa, 2006), innovation (e.g., Fagerberg, Fosaas, & Sapprasert, 2012; Fagerberg & Verspagen, 2009), and others (see Appendix A in Zupic & Cater (2014) for a full list). At the same time, other important fields like organizational behavior, learning at work, human resource management and its subfileds seems to lack systematic and quantitative literature reviews, leaving important theoretical and methodological questions practically with no

attention when it comes to its bibliometrics characteristics. In LNA field is no different: recent studies have showed that literature reviews, especially those based on bibliometric data are virtually nonexistent (Aguinis & Kraiger, 2009; Ferreira, Abbad, & Mourão, 2014; Gould et al., 2004).

"Learning needs" refers to skills gaps that workers need to know, understand, acquire, and apply for their performance to be effective in the organizational context, given the mission and organizational strategy. This competency gap can be remedied through formal or informal learning actions in the workplace. On the other hand, learning needs assessment (LNA) refers to a systematic process of collecting, analyzing, and reporting data and results about the internal and external factors that imply changes and challenges for the organization and individuals, which skills the worker must learn, who these workers are, and when and how they will learn (Ferreira, Abbad, & Mourão, 2014).

Learning Needs Assessment (LNA) can be considered an evolution of the terms "training needs assessment (TNA)", "educational needs assessment (ENA)", among others, with regard to the identification of different types of learning and instructional actions to address identified needs, not only the training itself. In general, when one say that had identified "training needs", the instructional strategy to fulfill these skill gaps is already given: training. The same thing happens when "educational needs" are described, since "Education" is an instructional stage of the Training, Development and Education (TD&E) system. Whenever the instructional strategy is predefined and mixed with the concept of competence gap or learning needs, we believe that the LNA processes results tend to be ineffective, as this will restrict all formal (simple information, instruction, training, development, education) and even informal learning strategies (see Marsick & Watkins, 2001, for example) that exists in the work context.

When the competence gap is conceptualized as a learning need, all the methodology and the providences that follows the research's results allow the use of the most diverse instructional and informal learning strategies available, proposing learning plans that are more closely related to the workers´ needs and organizations´ strategy, also allowing a more effective use of organizational resources related to human management in the workplace. This is the main difference between the concepts of LNA, TNA, ENA or others. In practical terms, the processes that lead to the identification of learning gaps can be very similar in our understanding. In this study we defend the use of the term "learning needs" to refer to skill gaps, but as a way to provide empirical evidences to the discussion on what terms are more commonly used by researchers, we decided to search for keywords on other terms, including LNA, TNA and ENA.

Even facing this important discussion on the concept of needs, there is still relatively little theoretical or empirical research on the topic (Aguinis & Kraiger, 2009; Kraiger, 2003), and literature searches are extremely rare (Altschuld & Watkins, 2014; Gould et al., 2004), many of which lack empirical bibliometric evidence that indicate the theoretical and methodological gaps, trends, strengths, and weaknesses of the field. Apparently, the knowledge produced since the 1960s (McGehee & Thayer, 1961) is of an eminently practical, diagnostic, and descriptive nature, such that the theoretical, critical, and epistemological

development of concepts, processes, constructs, methods, models, and approaches through bibliometric reviews of the topic is still incipient. Several authors characterize LNA research and practices as being *ad hoc* (Clarke, 2003; Ferreira, Abbad, & Mourão, 2014; Ford & Noe, 1987; McGehee & Thayer, 1961; Moore & Dutton, 1978; Ostroff & Ford, 1989; Taylor, O'Driscoll, & Binning 1998; Wexley, 1984). One of the reasons for this may be the lack of robust theoretical production that not only raises but specifically critically analyzes this knowledge longitudinally and with a basis in empirical data.

Traditional methods of narrative reviews are subjected to bias and can lack rigor due to the absence of empirical and replicable data and methods (Tranfield, Denyer, & Smart, 2003). That's why it seems so important to employ a quantitative approach for the description, evaluation, and monitoring of published research on LNA. Bibliometry has the potential to introduce a systematic, transparent, and reproducible review process and thus improve the quality of future reviews and researches. We aimed to map out a broad overview of the current state of scientific production on LNA (gaps, strengths, weaknesses, trends) and to analyze and criticize (Baumeister & Leary, 1997; Cooper, 2011) the characteristics of past and present production, as a way to propose a broad future research agenda in the coming decades.

2. Bibliometric Parameters, Materials and Method

Even though the growing interest by bibliometric studies in Management, there are almost no guidelines for conducting structured literature reviews with bibliometric methods regarding sample strategy, instrumentalization, variables definition and/or data analysis and collect procedures (Zupic & Cater, 2014). In this sense, we were guided by a heuristic, exploratory and descriptive method created by the authors and inspired in LNA field gaps reported in recent and classical studies (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017; Salas & Cannon-Bowers, 2001; Aguinis & Kraiger, 2009; Gould et al., 2004; Kozlowski & Chen, 2017; McGehee & Thayer, 1961; Ford & Noe, 1987; Wexley, 1984) and recent proposed bibliometric methods (Zupic & Cater, 2014; Vogel, 2014; Juliani & de Oliveira, 2016; El-Maamiry & Ghauri, 2013). For a full and detailed review of these methods, we strongly recommend reading these references. Figure 1 depicts our workflow to conduct this bibliometric study in a systematic way.

In terms of input, we first defined the questions and our research objectives. Next, we raised primary sources that provided support to justify and elaborate our proposal. Then, based on the previous steps, we defined the search strings. After this step, we chose the online databases in which the searches would be carried out, seeking to cover the main bases of scientific production in the world. Then we defined the criteria for selection of articles to be analyzed. So the time has come to define operationally which variables would help us achieve our research goals. In the processing step, we first did the article searches. We then apply the criteria for selecting articles for analysis. Then, in the data collection and analysis stage, we classified the articles according to the indicators of interest. So, finally, we were able to discuss the results achieved.

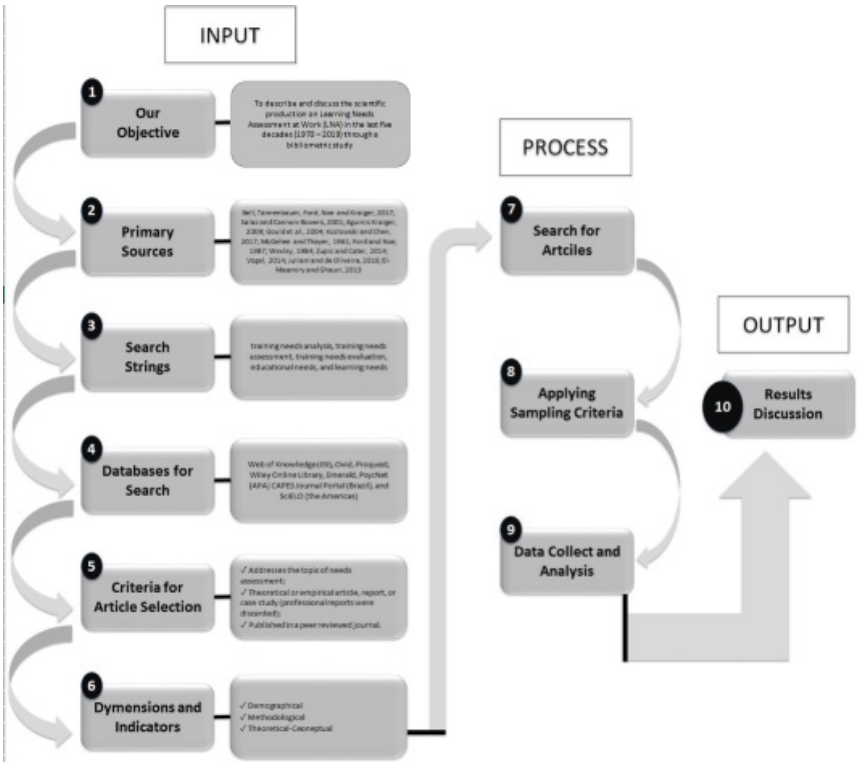

Figure 1. Workflow created by the authors to conduct the bibliometric study.

To define the quantitative dimensions for bibliometric study (demographical, methodological and theoretical), we observed mainly the prescriptions of Ferreira, Abbad and Mourão (2014), who said that the demographical, theoretical and/or methodological characteristics of LNA field are practically unknown, since the volume of scientific research increased dramatically in recent years and structured reviews focused on gather and analyze this data are virtually nonexistent. Our intention was to broaden the author´s analysis and bibliometric approach, proposing measures to critical LNA field gaps reported qualitatively in the field. In this study, the operational definition of these dimensions were:

- ✓ ***Demographical:*** refers to the demographic characteristics of the analyzed articles, such as year of publication, area of application and continent in which the author reported being institutionalized, measured through descriptive and categorical variables.
- ✓ ***Methodological:*** refers to the methodological characteristics of the articles analyzed, such as research design, nature of the data collected, sampling strategy, among others, measured through descriptive and categorical variables.
- ✓ ***Theoretical:*** refers to the theoretical and conceptual characteristics of the analyzed articles, such as which concept of needs is adopted, multilevel modeling, the use of learning taxonomies, among others, measured through descriptive and categorical variables.

To compose the dimensions´ indicators, we based the variables on critical gaps in LNA field reported by these and others authors. For example, Mossholder and Bedeian (1983) said that is important to LNA researches and practices to consider multilevel analysis to investigate

needs, so we proposed the theoretical variable "Adopts Multilevel Modeling?" ((1) doesn't adopt; (2) Micro and Meso; (3) Micro; (4) Meso and Macro; (5) More than three levels). Clarke (2003) have proposed that LNA organizational processes should consider political and/or strategical issues related to the organizational level, so we proposed the variables "Proposes or Cites Alignment between Strategy and Needs?" ((1) yes; (2) no) and "Considers the Organizational LNA Context?" ((1) yes; (2) no). McGehee and Thayer (1961) says that every LNA process should consider use samples with a diverse profile, including managers and workers of all possible areas, ages, gender, working time, etc, so we proposed the variable "Sample profile" ((2) Employees; (3) Managers; (4) Executives; (5) Mixed). In this sense, all the methodological and theoretical bibliometric variables were defined based on important gaps of the field, aiming to provide empirical evidence to respond questions referred in LNA literature as pitfalls in practice and research since the 1960s. The demographical dimension and indicators were considered in the analysis because it contains basic, precious and practically unpublished information on the distribution of knowledge production on LNA between countries, years and, mainly, areas of application of knowledge when it comes to needs assessment. A full description of these variables can be found in Table 1.

The following databases were searched: Web of Knowledge (ISI), Ovid, Proquest, Wiley Online Library, Emerald, PsycNet (APA) CAPES Journal Portal (Brazil), and SciELO (the Americas). The key words used to search for articles were (search strings): training needs analysis, training needs assessment, training needs evaluation, educational needs, and learning needs. Notwithstanding we had claimed in this study that the more appropriate term to refer to skill gaps is "learning needs", we decided to undertake an exploratory search for articles using the most common terms available in LNA literature, since there is no consensus on the appropriateness of adopting "learning needs" to the detriment of others terms, and we also had bibliometric variables focused on the issue of what concept is more broadly used.

The following criteria were taken into account to select the articles that were considered valid for analysis:

✓Addresses the topic of needs assessment;

✓Theoretical or empirical article, report, or case study (professional reports were discarded);

✓Published in a peer reviewed journal.

These criteria were considered trying to ensure that the articles analyzed were related to the topics of our research objective and qualitatively and broadly representative of the main characteristics of scientific production nowadays (Ravetz, 1971). Of the 324 papers primarily identified, 282 were considered valid for analysis after applying the selection criteria. The search, selection, and analysis of manuscripts occurred between August 2007 and April 2019, once a year, and was conducted by the authors as well as research group members specifically trained for the task. Considering the ten consecutive periods of survey and analysis of articles over the last ten years, we can say that the data collected have a longitudinal perspective, even if this aspect is not taken into account in terms of objectives and data analysis of this study. Our intention to make annual surveys of articles was to ensure

that the data and research results, even if simply descriptive, also contemplated eventual contextual variations that the sampled databases and articles could suffer during this period. For example, open access, or even government research funding issues in countries where LNA production is robust (e.g. England, United States) or emerging (e.g. Singapore, Indonesia, China, Brazil, Africa) could impact the rate of publication of articles, limit our access to manuscripts and therefore our analysis in a way that could lead us to misconceptions about the evolution of science on LNA over the last five decades. The publication date was not utilized as a selection criteria. The texts were analyzed based on three dimensions: demographic, methodological, and theoretical-conceptual. The dimensions for analysis as well as the variables that comprise the results are described in Table 1. The results are presented and discussed below.

3. Results And Discussion

The results are presented in Table 1.

Table 1. Bibliometric literature review results.

Dimension of Analysis	Variables/Indicators	Categories	Frequency (%)
Demographic	Decade of Publication	1970s (1970 - 1979)	2 (0,71%)
		1980s (1980 - 1989)	9 (3,19%)
		1990s (1990 - 1999)	34 (12,05%)
		2000s (2000 - 2009)	94 (33,34%)
		2010s (2010 - 2019)	143 (50,71%)
	Area of Application	Health (Medicine, Nursing, Psychiatry)	110 (39,01%)
		Management	67 (23,76%)
		Education	32 (11,35%)
		Organizational Psychology	30 (10,64%)
		Other	27 (9,57%)
		Public Administration	6 (2,13%)
		Information Technology	5 (1,77%)
		Economy	4 (1,42%)
		Marketing	1 (0,35%)
	Continent[1]	North America	90 (31,91%)
		Europe	85 (30,14%)
		Asia	43 (15,25%)
		South America	25 (8,87%)
		Africa	15 (5,32%)
		Oceania	10 (3,55%)
Methodological	Nature of the Study	Empirical	231 (81,91%)

Research Design	Theoretical	51 (18,09%)
	Descriptive	143 (50,71%)
	Correlational	86 (30,50%)
	Studies with no design (theoretical)	51 (18,09%)
	Explanatory-causal	2 (0,70%)
Type of Data Collected	Quantitative	114 (40,43%)
	Mixed	74 (26,24%)
	Doesn't apply (theoretical study)	51 (18,09%)
	Qualitative	43 (15,24%)
Method	Survey	203 (71,99%)
	Literature review or theoretical essay	56 (19,86%)
	Mixed	18 (6,38%)
	Observation	3 (1,06%)
	Quasi-Experimental or Experimental	2 (0,71%)
Source of Data	Primary	202 (71,63%)
	Not applicable (N/A)	53 (18,79%)
	Mixed	23 (8,16%)
	Secondary	4 (1,42%)
Sampling Technique	Non-probabilistic	196 (69,50%)
	Not applicable (teoretical study)	53 (18,80%)
	Probabilistic	22 (7,80%)
	Census	11 (3,90%)
Sample Profile	Not applicable (theoretical studies or empirical with other populations, e.g., students)	95 (33,69%)
	Employees	95 (33,69%)
	Mixed	75 (26,60%)
	Managers	16 (5,67%)
	Executives	1 (0,35%)
Instruments / Data Collection Procedures	Questionnaire	122 (43,26%)
	Mixed	77 (27,30%)
	Not applicable (theoretical studies)	53 (18,79%)
	Interview	15 (5,32%)

		Focus group	8 (2,85%)
		Document analysis	4 (1,42%)
		Observation script	3 (1,06%)
		Image and/or sound	0 (0%)
		Descriptive statistics	69 (24,47%)
		Inferential statistics	61 (21,63%)
		Mixed	61 (21,63%)
	Data Analysis Procedures	Not applicable (theoretical study)	51 (18,09%)
		Content analysis/ discourse analysis	40 (14,18%)
Theoretical-Conceptual		Training needs	198 (70,21%)
	Adopts the Concept of:	Learning needs	41 (14,54%)
		Other	27 (9,58%)
		Educational needs	16 (5,67%)
	Considers the Organizational LNA Context?	No	166 (58,87%)
		Yes	116 (41,13%)
	Adopts Multilevel Modeling?	Doesn't adopt	279 (98,94%)
		Micro and Meso	2 (0,71%)
		Micro, Meso and Macro	1 (0,35%)
		More than three levels	0 (0%)
	Proposes or Cites Alignment between Strategy and Needs?	No	195 (69,15%)
		Yes	87 (30,85%)
	Adopts or Cites ANA Model?	No	213 (75,53%)
		Yes	69 (24,47%)
	Proposes LNA Model?	No	259 (91,84%)
		Yes	23 (8,16%)
	Uses or Cites Taxonomies?	No	265 (93,97%)
		Yes	17 (6,03%)
	Investigates Predictors of Needs?	No	260 (92,20%)
		Yes	22 (7,80%)

The following text is structured in accordance with the analysis dimensions for the articles analyzed.

3.1 Demographic Characteristics

As for the decade of publication, it can be stated that the LNA literature registers an incremental increase over the last almost two decades (2000–2017), especially since 2012 and in Africa. More than 84% of the articles analyzed were published within this period. Only between the 1990s (1990 – 1999) and the early 2000s (2000–2009) the growth in publication of articles on LNA was 276%. In the present decade, that is not over yet (2010–2019), until early 2017, we already have 52% more articles published compared with all the production registered in the early 2000s, demonstrating the increasing interest of researchers and professionals on the topic still nowadays. From a macro point of view, we hypothesize that this number can come mainly from the great increase of available online journals databases that we experienced in the last 15 years, especially open-access (Antelman, 2004). Nowadays, through the internet is so easy to submit and to read a scientific article that is hard to have equivalent parameters to understand and/or to compare the access to scientific production we had in the 1970s and previously, when it was necessary to wait for months or even years to receive a single article or journal by mail, for example. At the same time, it seems that this remarkable increase in the number of articles published is being observed not only in LNA field, but also in the most diverse areas of knowledge and countries (Archambault, Campbell, Gingras, & Larivière, 2009), which reinforces our hypothesis about the increasing number of online databases in general. Despite the fact that these results could indicate, at the same time, an increase in the availability of and access to articles in digital databases, it can be deduced, from a micro point of view, that at least some increase can also be explained by the appearance of LNA topic on the strategic agendas of researchers and organizational leaders. Authors such as Aguinis and Kraiger (2009) had already indicated that the scientific field of Training and Development (T&D) in organizations as a whole had grown in the previous decades, which also certainly applies to LNA, a sub-area of T&D field.

As for the continents where LNA scientific production occurs, taking into account the country in which the authors reported their respective institutions, there was a predominance of US and European researchers, which together account for over 60% of the articles analyzed. There were no manuscripts produced by authors located in Canada or Mexico, although these countries are part of the North American continent. After that, Asia (15%), Brazil (8%, excluding South America, which considered alone contributed with 1%), and Oceania (4%) are the locations that produce more on LNA around the world.

In regards to the area of application, using the area of knowledge in which the results of the study were applied, surprisingly, health (mainly nursing, medicine, and occupational health) were the main areas in which LNA researches were produced. About 39% of the studies analyzed were designed to test and develop LNA technologies for the education of health professionals. Looking at areas that are focused on human health, principally biological sciences, medicine, and health, such an intense scientific investment in the instructional education of health professionals was not expected. This is also surprising because early studies on LNA occurred in areas of knowledge as Management and Organizational Psychology, exclusively focused on issues related to the efficiency of T&D processes of learning needs. Since then, it seems that this knowledge has been successfully integrated into

other areas, more focused on the effectiveness of processes and work routines in general, such as medical routines. These studies exhibited significant use of theoretical and methodological references from instructional psychology, organizational and work psychology and management, reinforcing that the scientific production on LNA has had success and applicability in other areas than those that were initially conceived, consolidating as a multi and transdisciplinary field of knowledge.

Management (24%), education (11%) and organizational psychology (10%) were second, third and fourth, respectively, as the areas that publish more articles on LNA. Therefore, the importance of developing transdisciplinary studies between education, psychology and management, as in the present case, is noted. In the field of health, Klemp, Frazier, Glennon, Trunecek and Irwin (2011) conducted an online survey in order to understand self-reports of educational needs and knowledge about topics related to survivor care and learning preferences expressed by oncology nurses. Participants reported on their level of mastery of 31 skills related to the care of cancer patients. An analysis of the principal components revealed five areas of knowledge related to care considered essential for the performance of nurses: long-term prevention, emotional/spiritual aspects, financial, and delayed effects. The area of greatest mastery (without indicating learning needs) was long-term prevention; the area with the least mastery reported by respondents (while indicating training needs) was financial.

In short, these are the demographic characteristics of the LNA studies analyzed. We believe that these are not exhaustive results on the demographic characteristics of the research, but we believe that a little light was shed on scientific production around the world, also discovering its areas of application, in such a way that future studies can expand the analyzes presented here.

3.2 Methodological Characteristics

With regard to the nature of the articles analyzed, there is a prevalence of empirical articles (78%). These results support previous findings in the literature (Ferreira, Abbad, & Mourão, 2014; Kraiger, 2003) that warn for the fact that there is little concern for developing theories about learning needs at work. Apparently, the studies are almost exclusively applied to the detriment of theoretical requirements in the field that allow, for example, for the development and testing of predictive models. Regarding the research design, there is a predominance of descriptive studies (50%). There is also a considerable presence of correlational research design (31%) as well as studies without design (18%) due to the fact that they are theoretical. These results also demonstrate the almost exclusively descriptive character that is applied to research on LNA, with little concern on the part of researchers for developing theories or investigating predictors of learning needs through correlational or explanatory causal research. This issue will be discussed later in this article.

With regards to the type of the data collected, 41% of the studies reported using quantitative data. Studies that reported the use of mixed data (qualitative/quantitative) were around 26%, while those that used exclusively qualitative data amounted to 15%; 18% of the cases were theoretical studies, which is why the classification of the nature of the data collected did not

apply. Although there is some consensus in the literature that mixed methods are more comprehensive in terms of data and inferences and allow a closer relationship with the disciplinary boundaries of knowledge (Creswell, Goodchild, & Turner, 1996; Greene, Caraceli, & Graham, 1989; Onwuegbuzie & Teddlie, 2003; Tashakkori & Teddlie, 1998), it appears that LNA literature is still characterized by the use of only one data collection technique and analysis in each study.

As for the research method used to conduct the studies, a hegemonic dominance of surveys (203; 72%) was observed in the sample of articles analyzed. The second most common method was literature reviews (56; 20%), including three empirical literature surveys. The use of mixed methods (survey + observation) is uncommon. Studies that make use of observation or experimental/quasi-experimental designs appear to be virtually nonexistent in the field of learning needs at work, representing less than 2% of the studies.

Bowers, Jentsch, Salas and Braun (1998) conducted experiments in order to investigate how communication sequences within work teams may contribute to the understanding of learning needs processes in simulated flight tasks. The results indicated that the groups that had their communication sequences mapped before the task, indicating that their learning needs to communicate were identified, showed better subsequent performance than those who had not. Sequential analysis showed communication is thus an important factor to understand the performance of teams, especially for mapping the learning needs of the workers with regard to the communication sequence required to complete a flight simulation task.

Regarding the source of the data used in LNA research, the use of primary data (202; 72%) is predominant. This variable was not applied to 19% of the studies because they were theoretical; mixed data (8%) or secondary sources (1%) appears in sequence. The results indicate that, when it comes to learning needs at work, the use of primary data is most common. If learning needs are skills gaps, and skills are constructs that are almost unique to each organization (depending on the business, the competition and differentiation strategies, its structure, mission, vision and values, etc.), the use of primary data, in this sense, can be one of the best options to investigate needs. However, it is worth mentioning that there is still the possibility of investigating skills that are considered to be generic, in other words, skills that are useful to various areas of a same organization or to several same types of organizations, thus allowing for the use of primary and secondary data or even for the use of standardized measurement instruments for a group of organizations or organizational areas.

With regard to the sampling techniques used in the articles analyzed, there is a strong predominance of non-probabilistic strategies (196; 70%). In 18% of the studies analyzed, this criterion was not applied because they are theoretical. Probabilistic techniques (8%) and census sampling (4%) of the research participants are still rarely used to investigate learning needs at work. The lack of emphasis on research designs that require the application of probabilistic sampling techniques that could permit the generalization of results for a population of interest is noticeable. Apparently, LNA research is focused on jobs, occupational areas, and strictly defined professional segments, studied according to the convenience and subsequently isolated from the organizational context, e.g., strategies and macro processes that address various segments and organizational units.

Regarding the profile of the respondents of the studies analyzed, there is a relative balance of manuscripts that reported addressing only employees (33%) and those who reported the use of mixed samples (27%). This criterion was not applied to 34% of the researches analyzed because many of the studies were theoretical or empirical but addressed other samples profiles, such as customers, suppliers, students, or even patients, for example. Studies that were exclusively composed of manager (6%) or executive (not even 1%) samples were a minority of the total articles analyzed. On the one hand, this result can be considered encouraging because it shows that some LNA research has partially operationalized several authors' premises regarding the need to engage the most heterogeneous sample possible (Clarke, 2003; Ford & Noe, 1987; McGehee & Thayer, 1961; Moore & Dutton, 1978; Ostroff & Ford, 1989; Taylor, O'Driscoll, & Binning, 1998; Wexley, 1984). On the other hand, it can be observed that the almost exclusive participation of employees who do not occupy management positions is prevalent in research on the topic, demonstrating that management levels need to be addressed in future studies.

With regard to the instruments and data collection procedures, the results showed a strong predominance of questionnaires (43%), which is in line with the empirical and quantitative nature, as well as the survey method and the primary source of data used in research, as discussed above. Research on LNA also reports the use of mixed procedures (27%), interviews (5%), focus groups (3%), document analysis (2%), and observation scripts (1%). Apparently, the large gap in terms of instruments/collection procedures is in the use of image and/or sound in LNA research, typical strategies for observational and qualitative research.

Concluding the methodological dimension of analysis, we examined the results regarding the data analysis procedures used in the sampled manuscripts. The use of statistical data analysis is predominant. There is a balance between descriptive (25%) and inferential (22%) statistics. These results are consistent with quantitative methods used in many studies analyzed. Mixed analysis procedures are also reported in some of the articles (21%) and qualitative strategies in others (14%). For example, Clarke (2003) tried to investigate the influences of organizational policies (understood as the result of the conflict of interests and power relations established in the organization) in LNA processes. Questionnaires, focus groups, and semi-structured interviews were used as data collection strategies. Techniques of thematic categorical content analysis were used to analyze qualitative data and nonparametric inferential statistics (Mann-Whitney test) to analyze quantitative data.

3.3 Theoretical-Conceptual Features

Recent studies have raised the issue on the more appropriate term to refer to competencies gaps at work. It seems "training needs" does not appear to be the most accurate term to refer to skills gaps at work since there are numerous possible strategies to be applied to solve or reduce gaps in knowledge, skills, and attitudes, not only training (Abbad & Mourão, 2012; Ferreira, Abbad, & Mourão, 2014). Setting up the instructional strategy chosen to answer a competency gap as a diagnostic process *a priori* does not seems to be the most appropriate choice in terms of theory, method, and practice (utilization of resources, for example). In order to provide an empirical basis for this discussion, we investigated which concepts are most widely adopted in the LNA literature: training, learning, or educational needs. The

results point to a predominant use of the term “training needs” (70%) to refer to skills gaps at work. The term “learning needs” (15%) also finds space in the literature, but much less. The term “educational needs” (5%) and others such as “development needs”, “ability needs”, or “skills needs” are also used to an even lesser extent.

A reduction in or an elimination of the skills gap is not always achieved through training or long-term educational programs. The term training needs can create confusion, leading to the false understanding that learning at work only occurs through formal education programs. Perhaps the more precise and comprehensive expression used to address the issue is “learning needs”, which covers a wider range of solutions, including in-service learning, informal learning, and knowledge management in the organization. The usual expression includes both the problem (need, gap) as well as the solution (training), which restricts the solution to just one type of learning situation. There is confusion, as well, with what is expected of the process: training (or an instructional action) and what is expected of the individual (learning, retention, and also the application of knowledge, skills, and attitudes at work). For these reasons, we consider the use of the term “learning needs” the most appropriate and accurate to refer to a skills gap at work.

Another recommendation that has been documented in seminal texts, such as Ostroff and Ford (1989), McGehee and Thayer (1961), Moore and Dutton (1978), among other recent articles, is that all LNA processes should take the internal and/or external organizational context into account in order to investigate skills gaps. However, it is noted that this recommendation is still rarely implemented in the research and practice of LNA. Only a portion of the studies (41%) reported the importance of the organization’s internal and/or external environmental analysis to investigate learning needs. Much of the research (59%) did not report this practice, or when it was theoretical, it did not recommend this procedure.

Another theoretical-conceptual issue that has been in the literature for many years is the adoption of multilevel modeling (MM) (Hox & Roberts , 2011; Hox, 2010; Kreft & De Leeuw, 1998; Raubendush & Bryk, 2002; Snijders & Bosker, 1994) in LNA research (Abbad, Freitas, & Pilati, 2006; Ferreira, Abbad, & Mourão, 2014; Koslowski et al, 2000; Mussholder & Bedeian, 1983; Ostroff & Ford, 1989; Pilati, 2006). MM can be considered a cutting-edge topic that is highly relevant to LNA research and organizational practices, which is precisely why it is being addressed in the present study. Thanks to the introduction of multilevel models of learning needs research it is now possible to identify the needs of entire teams and assess the degree and manner in which tasks overlap, i.e., the interdependence of tasks. Mossholder and Bedeian (1983) were pioneers in proposing the use of such an approach in research related to organizational learning needs. More recently, this literature received contributions from Koslowski et al (2000), and, in Brazil, for example, from Puente-Palacios and Laros (2009) and Coelho Jr. and Borges-Andrade (2011). Among the few texts that recommend the adoption of the multilevel approach to LNA research, the article by Ostroff and Ford (1989) stands out. Even if a multilevel approach is not adopted, as defined by these authors, many others had already stressed the importance of investigating variables at macro levels (the organization), meso levels (groups and process) and micro levels (the individual) (Abbad & Mourão, 2012; Abbad, Freitas, & Pilati, 2006; Ferreira, Abbad, & Mourão, 2014;

Ford & Noe, 1987; McGehee & Thayer, 1961; Moore & Dutton, 1978; Wexley, 1984).

It is noted that, in theoretical terms, there is sufficient support for the design and testing of multilevel models in LNA research. However, empirically, what is seen in scientific literature is the opposite. Almost 100% of the articles analyzed do not report the adoption of MM to investigate needs. Despite the fact that with a more accurate interpretation, the variables reported in the studies under discussion (e.g., occupational space needs, position needs, the individual level, the group level) can be organized into levels, the authors do not explain, discuss, or analyze multilevel issues in the literature. Thus, it can be said, based on the results shown in Table 1, that the multilevel approach has, in fact, not yet been adopted in LNA studies. Therefore, this issue still presents itself as a long and rich research agenda for LNA.

Pilati (2006) emphasizes that, from the perspective of learning needs assessment in organizations, current trends are in developing methods that seek to align the training actions with organizational strategies. However, what is observed in our results is that a considerable part of the studies analyzed did not report the intention or the importance of aligning organizational strategy and learning needs (195; 69%). The use of techniques to investigate future and strategic needs is very important for planning instruction that is aligned to individual skills that need to be developed so that the organization will be able to achieve its objectives through strategic cycles of time. Perhaps because LNA practices and research are firmly based on occupations and professions, having a more reactive and short-term perspective, lacking a multilevel and prospective analysis, the alignment between needs and strategies are reduced.

Research models are important means of developing methods and theories regarding learning needs in organizational environments. The theoretical elaboration required for the design and testing of a model facilitates the development of constitutive and operational definitions of antecedent and consequent variables of individuals' and organization's learning needs. The methodological rigor to test an LNA model can also contribute towards the development of tools and organizational processes to support more efficient and effective learning. However, the proposal of LNA models, whether theoretical or empirical, is still incipient in the literature, as revealed in Table 1. Only 8% of the articles analyzed propose LNA model (e.g. Iqbal & Khan, 2011; Borich, 1980; Ebrahim, 2015; Forbes, While, & Ullman, 2006; MacLean & Cahillane, 2015, among others). Even if the proposition of a model is not something trivial, we expected a slightly higher number of studies that explores the modeling of needs as a phenomenon, in order to have more clarity about its dynamics in the work context and its general characteristics. The results also showed that, besides being rare, existing LNA models are still poorly adopted or even cited. A total of 69 studies (25%) cited or adopted LNA models. One of the most important pitfalls of LNA researches and organizational processes reported in the literature is that they are *ad hoc*. Our results points that this pitfall could be seated in the fact that it is still unusual to researchers and practitioners choose a LNA model for conducting skills gaps assessments. In this sense, LNA practices and studies have been conducted with no global guidance and patterns, being based on contextual and *ad hoc* decisions that lead to less effective studies and organizational processes. The contributions of models for the investigation of social phenomena and also for

structuring organizational practices may be relevant (Wellington & Szczerbinski, 2007). Despite the increase of 43% in studies citing or adopting LNA models in the last decade (2010s), the results suggest that, in addition to being scarce, the LNA models currently available in the literature seem not to have found support for their use in TD&E management practices in organizations.

The use of learning outcomes taxonomies to describe needs can be very useful for the integration of LNA subsystems and instructional planning and execution. Taxonomies of learning outcomes can provide important insights to tailor instructional strategies (defined in the planning and execution stage) to the nature and level of complexity of the skills that need to be learned (defined in the LNA stage) (Abbad, Freitas, & Pilati, 2006). However, it is notable that the use of taxonomies is almost nonexistent in literature to describe and investigate learning needs at work. Almost 94% of the sampled manuscripts has any consideration on this topic, showing that there is still a considerable unfamiliarity of scientists and practitioners on the solid contribution that learning taxonomies can give to enhance LNA theories and methods (Ferreira, Abbad, & Mourão, 2014).

Finally, considering the theoretical-conceptual dimension, data shows that only 7% of the manuscripts analyzed report studies that considered investigate antecedent variables of learning needs. One can say that we still know very little about what kind of variables can affect and create individual and organizational skills gaps. On this issue, all that we could find in literature are the theoretical prescriptions of some seminal (e.g. McGehee & Thayer, 1961; Ford & Noe, 1987; Mossholder & Bedeian, 1983) and more recent studies (e.g. Taylor, O'Driscoll, & Binning 1998; Clarke, 2003; Ferreira, Abbad, & Mourão, 2014). In general, the authors propose that learning needs could be related to variables like economy, technology, laws (all in macro level); work context and organization, tasks characteristics, leadership (all in meso level); and locus of control, performance, skills (all in the micro level), for example. Even with these theoretical prescriptions there is still a lack of empirical studies focused on exploring the predictive relations between these variables in such a way that we can say they are scarce or virtually nonexistent. The study of learning needs predictor variables could assist in the management of instructional actions in organizations, to the extent that it could reveal internal and/or external variables related to the emergence of skills gaps in workers. It would therefore be possible to minimize the effects of these variables or to plan and execute proactive instructional actions for the development of emergent skills at work. However, the results showed only a small portion of the analyzed studies investigate antecedent variables of learning needs.

Consequently, the main demographic, methodological, theoretical, and conceptual characteristics of a significant part of the scientific knowledge, as well as shortcomings, of LNA have been analyzed. These results serve as important inputs to justify and guide this research.

4. Conclusion: Lna, Past - Present - Future

The longitudinal and descriptive results obtained through the bibliometric study allows a glimpse into how the production of knowledge about LNA was characterized in the past

(1970s to 1990s), is characterized in the present (2000-2019) and, especially, how it could (or should) move forward in the future (2019 onwards).

In the past, the seminal studies' main contribution was that of shedding light on a subject that had been, until the 1960s, virtually neglected in the literature on learning and organizational studies. From that time, much has been garnered, even today, with respect to the initial proposals to define the terms learning needs and learning needs assessment. However, the underlying methods of the seminal models in LNA (e.g. McGehee & Thayer, 1961; Ford & Noe, 1987; Mossholder & Bedeian, 1983) suffered due to the fact that they have an almost exclusive focus on the micro level of analysis, contemplating the individual and the immediate needs related to position and/or occupational space. Also, in the past, the scientific production was highly focused on the individual in his/her current position; moreover, it was disconnected from any relationship to a future, strategic, or contextual perspective. Past production on needs was also highly focused, for many years, on differentiating skills gaps (learning needs) from performance gaps (Mager & Pipe, 1979). Notwithstanding, this critical investment of scientific production yielded good results. For example, since then, there is more clarity and consensus that performance, learning and learning needs depends much on organizational support and dynamics issues that impacts the tasks and occupational characteristics (Rhoades & Eisenberger, 2002). This was an important advance in terms of recognizing that needs should be investigated on a more broad perspective, contemplating not only individual but also organizational variables.

Currently, we can say that the scientific literature on LNA is in an ambiguous period. On the theoretical side, there has been little progress with regard to the discussion on the relevance of the term "training needs" to refer to skill gaps at work. Since the 1960s, little has been critically discussed about its accuracy, validity, or convergence, or the issue of revising/updating the concepts of needs and needs assessment. Much of the scientific production also shows its connection to the tendency to understand skills gaps as training needs, which greatly reduces the amplitude of actions (formal or informal) which can be applied to suppress or decrease a learning need at work. Moreover, the issue on the levels of analysis at which the learning needs phenomenon can manifest is still, theoretically, absent. From a theoretical point of view, we believe that these are the main pitfalls of LNA scientific production in the present because once they are addressed, a new and extensive agenda could be possible in the future.

However, on the other hand, the LNA scientific literature has begun to show methodological creativity, to the extent that advances have been noted when compared to the seminal studies, despite the fact that these methods are still strongly focused on the individual level. Especially in the area of health, current research shows considerable progress in the development of psychometric scales with empirical evidence of validity. Methodologically, this fact opens related research agendas, for example, the development of predictive models and research on variables that may be related to skills gaps at work, allowing for more and better understanding of the phenomenon and its antecedents and consequents. It can be said that many LNA methods proliferated over the last 20 years, such as the use of scales of importance and domain, as well as using self- and hetero-evaluations, for example.

Despite this relative methodological advance, the future research agenda on learning needs assessment seems to be ample. Many questions have not been answered, or even widely referenced, and/or accepted by the global scientific community. In addition to issues related to the concept of needs, attention needs to be drawn to others that are found in the theoretical and methodological fields. The consideration of the organizational context as an important dimension of the LNA process is still limited. Internal (e.g., strategy, resources, mission, structure) and external environment variables (e.g., laws, safety, technology, stakeholders) are still neglected in many LNA studies. This may be the result of a theoretical definition which is based almost exclusively on the micro level, which considers the individual to be the sole actor in the process and where training is the main instructional strategy to address learning needs.

The issue of multilevel modeling (MM) also presents itself as one of the main research agendas in the area. We found only one manuscript that addresses the issue on MM in LNA (Mussholder & Bedeian, 1983), demonstrating the urgency of studies proposing MM models. There are several studies highlighting that when a phenomenon manifests and consequently can be theoretically organized and empirically investigated at different levels of analysis (hierarchically), the MM is the best strategy to undertake research, since it allows to identify the variances of the object at each level, preserving the isomorphism and therefore being more representative of reality (Hox & Roberts , 2011; Hox, 2010; Kreft & De Leeuw, 1998; Raubendush & Bryk, 2002; Snijders & Bosker, 1994). That is exactly the case of learning needs. Since the 1960s, production has gathered information enough that can currently help to structure the phenomenon of needs at work in a hierarchical perspective, allowing for the development and test of models at different levels of interest. Currently, there are models available in the literature that allow for this development, to the extent that they demonstrate theoretically and empirically which variables can compose a procedural and multilevel study of learning needs, considering the macro (internal and external organizational environment), meso (characteristics of groups and/or organizational units), and micro (individual characteristics) levels (Mussholder & Bedeian, 1983; Iqbal & Khan, 2011; Borich, 1980; Ebrahim, 2015; Forbes, While, and Ullman, 2006, among others). However, virtually nothing has been produced in the last 40 years in terms of multilevel modeling applied to the evaluation of learning needs.

Finally, another important research agenda is related to the use of learning outcomes taxonomies to investigate needs. The use of taxonomies in the LNA process will strengthen its grip on the later stage (planning and execution) of any instructional system. Taxonomies allow for not only the definition of more precise skills items, relative to the level of complexity of knowledge, skills, and attitudes necessary, but also clearly demonstrate what are the best decisions in terms of planning and execution learning strategy as, for example, the most appropriate kind of course (classroom, distance, or blended), the level of proficiency required for the course (basic, intermediate, or advanced), the depth and quality of instructional materials, among many others.

It is imperative that the future agenda of studies in LNA focus on the exploration of answers to these questions by using more advanced statistical tools than those used in this study, to the

extent that they are not an end in themselves, as they will certainly reveal new questions to be explored in an even more distant future than what is glimpsed here.

References

Abbad, G., Pilati, R., & Pantoja M. J. (2003). Preditores de efeitos de treinamento: O estado da arte e o futuro necessário [Antecedents of training effects: State of the art and the necessary future]. *Revista de Administração da USP, 38*(3): 205–218.

Abbad, G., & Mourão, L. (2012). Avaliação de Necessidades de TD&E: Proposição de um novo Modelo [TD&E needs assessment: proposition of a new model]. *Ram, Rev. Adm. Mackenzie, 13*(6): 107–137.

Abbad, G., Freitas, I. A. de, & Pilati, R. (2006). Contexto de Trabalho, Desempenho Competente e Necessidades em TD&E [Work context, eficiente performance and needs in TD&E]. In Borges-Andrade, J. E., Abbad, G. da S. and Mourão, L. (Eds.), *Treinamento, Desenvolvimento e Educação em Organizações e Trabalho: Fundamentos para a Gestão de Pessoas [Training, Development and Education in Work Context: Human Resources Management Basis]:* 231–254. Porto Alegre: Artmed.

Aguinis, H., & Kraiger, K. (2009). "Benefits of training and development for individuals and teams, organizations, and society". *Annual Review of Psychology, 60:* 451–474.

Altschuld, J. W., & Watkins, R. (2014). A primer on needs assessment: More than 40 years of research and practice. In J. W. Altschuld and R. Watkins (Eds.), *Needs assessment: Trends and a view toward the future. New Directions for Evaluation, 144:* 5–18.

Antelman, K. (2004). Do Open-Access Articles Have a Greater Research Impact? *College & Research Libraries, 65*(5): 372–382. doi: 10.5860/crl.65.5.372.

Archambault, É., Campbell, D., Gingras, Y., & Larivière, V. (2009). Comparing Bibliometric Statistics Obtained From the Webof Science and Scopus. *Journal of the American Society for Information Science and Technology, 60*(7): 1320–1326.

Baumeister, R. F., & Leary, M. R. (1997). Writing narrative literature reviews. *Review of General Psychology, 1*(3): 311–320.

Bell, B. S., Tannenbaum, S. I., Ford, J. K., Noe, R. A., & Kraiger, K. (2017). 100 years of training and development research: What we know and where we should go. *Journal of Applied Psychology, 102*(3): 305–323.

Borich, G. (1980). A Needs Assessment Model for Conducting Follow-up Studies. *Journal of Teacher Education, 31*(1): 39–42.

Bowers, C. A., Jentsch, F., Salas, E., & Braun, C. C. (1998). Analyzing communication sequences for team training needs assessment. *Human Factors, 40*(4): 672–679.

Clarke, N. (2003). The Politics of Training Needs Analysis. *Journal of Workplace Learning, 15*(4): 141–153.

Coelho Jr., F. A., & Borges-Andrade, J. E. (2011). Discussão sobre algumas contribuições da modelagem multinível para a investigação de desempenho no trabalho [Discussion on some contributions of multilevel modeling for performance research at work]. *Psico-USF, 16*: 135–142.

Cooper, H. M. (2011). Reporting research in psychology: how to meet journal article reporting standards. Washington, DC: APA (American Psychological Association).

Creswell, J. W., Goodchild, L., & Turner, P. (1996). Integrated qualitative and quantitative research: Epistemology, history, and designs. In Smart, J. (Ed.), *Higher education: Handbook of theory and research:* 90–136. New York: Agathon Press.

Di Stefano, G., Verona, G., & Peteraf, M. (2010). Dynamic capabilities deconstructed: A bibliographic investigation into the origins, development, and future directions of the research domain. *Industrial and Corporate Change, 19*(4): 1187–1204.

Ebrahim, M. I. (2015). Learning Needs Assessment (LNA) and Evaluation of Learning Outcomes: a Scientific Approach. *International Journal of Arts & Sciences, 8*(6): 503–512.

El–Maamiry, A. A., & Ghauri, M. A. (2013). Measuring information quality: Concerns on the use of bibliometric studies. *International Journal of Information Dissemination and Technology, 3*(4): 274–278.

Fagerberg, J., & Verspagen, B. (2009). Innovation studies: The emerging structure of a new scientific field. *Research Policy, 38*(2): 218–233. doi:10.1016/j.respol.2008.12.006.

Fagerberg, J., Fosaas, M., & Sapprasert, K. (2012). Innovation: Exploring the knowledge base. *Research Policy, 41*(7): 1132–1153. doi:10.1016/j.respol.2012.03.008.

Ferreira, R. R., Abbad, G. S., & Mourão, L. (2014). Training Needs Analysis at Work. In Kraiger, K., Passmore, J., Malvezzi, S. and dos Santos, N. R (Eds.). *The Wiley Handbook of Training, Personal Development and E-Learning: 3*2–48. London: Wiley Blackwell.

Forbes, A., While, A., & Ullman, R. (2006). Learning needs analysis: The development of a tool to support the on-going professional development of multiple sclerosis specialist nurses. *Nurse Education Today, 26:* 78–86.

Ford, J. K., & Noe, R. A. (1987). Self-Assessed Training Needs: the Effects of Attitudes Toward Training, Managerial and Function. *Personnel Psychology, 45*: 511–527.

Gartner, W. B., Davidsson, P., & Zahra, S. A. (2006). Are you talking to me? The nature of community in entrepreneurship scholarship. *Entrepreneurship Theory and Practice, 30*(3): 321–331.

Gould, D., Kelly, D., White, I., & Chidgey, J. (2004). Training needs analysis: a literature review and reappraisal. *International Journal of Nursing Studies, 41*(5): 471–486. doi: 10.1016/j.ijnurstu.2003.12.003.

Greene, J. C., Caracelli, V. J., & Graham, W. D. (1989). Toward a conceptual framework for

mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 21*(11): 255–274.

Hox, J. (2010). *Multilevel Analysis: Techniques and Applications.* New York: Routledge.

Hox, J., & Roberts, J. K. (2011). *Handbook of Advanced Multilevel Analysis.* New York: Routledge.

Iqbal, M. Z., & Khan, R. A. (2011). The growing concept and uses of training needs assessment: a review with proposed model. *Journal of European Industrial Training, 35*(5): 439–466.

Klemp, R. J., Frazier, L. M., Glennon, C., Trunecek, J., & Irwin, M. (2011). Improving Cancer Survivorship Care: Oncology Nurses' Educational Needs and Preferred Methods of Learning. *Journal of Cancer Education, 26*: 234–242.

Koslowski, S. W. J., & Chen, G. (2017). One Hundred Years of the Journal of Applied Psychology: Background, Evolution, and Scientific Trends. *Journal of Applied Psychology, 102*(3): 237–253.

Koslowski, S. W. J., Brown, K., Weissbein, D., Cannon-Bowers, J., & Salas, E. (2000). A Multilevel Approach to Training Effectiveness: Enhancing Horizontal and Vertical Transfer. In Klein, K., & Koslowski, S. W. J. (Eds.), *Multilevel Theory, Research and Methods in Organization:* 157–210. San Francisco, CA: Jossey-Bass.

Kraiger, K. (2003). Perspectives on training and development. In Borman, W. C., Ilgen, D. R., & Klimoski, R. J. (Eds.), *Comprehensive handbook of psychology, 12:* 171–192, Hoboken: Wiley Blackwell.

Kreft, I. G. G., & De Leeuw, J. (1998). *Introducing Multilevel Modeling.* London: Sage.

Landström, H., Harirchi, G., & Aström, F. (2012). Entrepreneurship: Exploring the knowledge base. *Research Policy, 41*(7): 1154–1181.

Ludwig, A. C. W. (2009). *Fundamentos e prática de metodologia científica [Fundamentals and practice of scientific methodology].* Petrópolis, Brazil: Vozes.

MacLean, P., & Cahillane, M. (2015). The human factor in learning design, research, policy, and practice. *The International Journal of Information and Learning Technology, 32*(3): 182–196.

Mager, R. F., & Pipe, P. (1979). *Analysing Performance Problems.* Belmont: Lake Publishing.

Marsick, V. J., & Watkins, K. E. 2001. Informal and Incidental Learning. ***New Directions for** Adult and Continuing Education, 89*: 25–34.

McGehee, W., & Thayer, P. W. (1961). *Training in Business and Industry.* New York: Wiley Blackwell.

Moore, M. L., & Dutton, P. (1978). Training Needs Analysis: Review and Critique. *Academy of Management Review, 2*: 532–545.

Mossholder, K. W., & Bedeian, A. G. (1983). Cross-level Inference and Organizational Research: Perspectives on Interpretation and Application. *Academy of Management Review, 8*: 547–558.

Nerur, S. P., Rasheed, A. A., & Natarajan, V. (2008). The intellectual structure of the strategic management field: An author co-citation analysis. *Strategic Management Journal, 29*(3), 319–336. doi:10.1002/smj.659.

Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In Tashakkori, A., & Teddlie, C. (Eds.), *Handbook of mixed methods in social and behavioral research:* 351–383. Thousand Oaks, CA: Sage.

Ostroff, C., & Ford, K. (1989). Introducing a Levels Perspective to Training Needs Assessment. In Goldstein, I. (Ed.), *Training and Career Development:* 25–62. San Francisco, CA: Jossey Bass.

Pilati, R. (2006). História e importância de TD&E [History and Importance of TD&E]. In Borges-Andrade, J. E., Abbad, G. and Mourão, L. (Eds.)*, Treinamento, Desenvolvimento e Educação em Organizações de Trabalho: fundamentos para a gestão de pessoas [Training, Development and Education in Work Context: Human Resources Management Basis]:* 159–176. Porto Alegre: Artmed.

Puente-Palacios, K. E., & Laros, J. A. (2009). Análise multinível: contribuições para estudos sobre efeito do contexto social no comportamento individual [Multilevel analysis: contributions to studies investigating the effects of social context on individual behavior]. *Estudos de Psicologia (Campinas), 26*(3): 349–361.

Ramos-Rodriguez, A. R., & Ruiz-Navarro, J. (2004). Changes in the intellectual structure of strategic management research: A bibliometric study of the Strategic Management Journal, 1980-2000. *Strategic Management Journal, 25*(10): 981–1004. doi:10.1002/smj.397.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: applications and data analysis methods.* London: Sage Publications.

Ravetz, J. M. (1971). Scientific Knowledge and its Social Problems. Oxford: Clarendon Press.

Rhoades, L., & Eisenberger, R. 2004. Perceived Organizational Support: A Review of the Literature. *Journal of Applied Psychology, 87*(4): 698–714.

Salas, E., & Cannon-Bowers, J. A. (2001). The science of training: A decade of progress. *Annual Review of Psychology, 52*: 471–499.

Schildt, H. A., Zahra, S. A., & Sillanpaa, A. (2006). Scholarly communities in entrepreneurship research: A co-citation analysis. *Entrepreneurship Theory and Practice, 30*(3): 399–415.

Snijders, T. A. B., & Bosker, R. (1994). Modeled variance in two-level models. *Sociological Methods and Research, 22*: 342–363.

Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and*

quantitative approaches. Thousand Oaks, CA: Sage.

Taylor, P., O'Driscoll, M., & Binning, J. (1998). A new integrated framework for training needs analysis. *Human Resource Management Journal, 8*: 29–50.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management, 14*(3): 207–222. doi:10.1111/1467-8551.00375.

Wellington, J., & Szczerbinski, M. (2007). Research methods for the social sciences. London: Continuum.

Wexley, K. N. (1984). Personal Training. *Annual Review of Psychology, 35*: 519–551.

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