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Learning for the transfer of knowledge in research centers of the Colombian coffee industry

Aprendizaje para la transferencia de conocimiento en centros de investigación de la industria del café de Colombia

C. E. Marulanda-Echeverry , M. L. Trujillo M. López-Trujillo , R. A. Castaño-Zapata 

Abstract— Organizational dynamics in research centers require considering learning as a fundamental factor of knowledge transfer. The findings presented in this article are based on the results of research on the impact of learning on knowledge transfer in 24 research centers and institutes in the Colombian coffee triangle. Based on qualitative research and with descriptive and correlative types of studies, the aim was to establish such incidence. The results show that competencies, training and consulting for the transfer of knowledge are the best evaluated, while the valuation of other variables such as papers and articles is very low, which makes it necessary to think and implement actions that allow the results of the transfer to be more visible in academic circles. It can be concluded that organizational learning is a key factor for the transfer of knowledge and it is intended that the results presented formulate strategies in these organizations to advance in the transfer of knowledge.

Index Terms— Learning, knowledge transfer, research centers.

Resumen— Las dinámicas organizacionales en los centros de investigación, requieren de considerar el aprendizaje como factor fundamental de la transferencia de conocimiento. Los hallazgos presentados en este artículo se basan en los resultados de una investigación sobre la incidencia del aprendizaje en la transferencia de conocimiento en 24 centros e institutos de investigación del triángulo de café de Colombia. Basado en una investigación cualitativa y con tipos de estudios descriptivos y correlacionales, se pretendió establecer dicha incidencia. Los resultados muestran que las competencias, la capacitación y las consultorías para la transferencia del conocimiento, son las mejor evaluadas, mientras que la valoración de las demás variables como ponencias y artículos es muy baja lo que hace necesario pensar y ejecutar acciones que permitan que los resultados de la transferencia, sean más visibles en medio académicos. Se puede concluir que el aprendizaje organizacional es un factor clave para la transferencia de conocimiento y se pretende que los resultados presentados formulen estrategias en estos organismos para avanzar en la transferencia de conocimiento.

Palabras claves— Aprendizaje, transferencia de conocimiento, centros de investigación.

I. INTRODUCTION

THE changing, complex, technological and accelerated world of today demands new organizational dynamics and it is in this sense that the appropriation and generation of a culture of management and knowledge transfer must be considered for the development of strategies that allow organizations to focus on people and their knowledge.

Accordingly, [1] explain that knowledge management is the focus of agile organizations and an organization's competitive advantage is directly affected by its ability to create, identify, share and apply knowledge. Today's economy requires organizations to use their knowledge assets to create sustainable value for the organization over time. The ability to facilitate the transfer of information and repeatable skills from those who have what they have learned to those who need to learn it is fundamental to becoming a constant learning organization. Organizations that are able to effectively transfer knowledge from one unit to another will be more productive and more likely to survive than those that are less skilled in knowledge transfer

In this line, organizations face increasingly uncertain market demands and intense competition, and must acquire valuable knowledge from all possible sources. Knowledge transfer is an important practice that significantly improves a company's competitive advantage. The literature on knowledge transfer presents background on incentives and training programs, trust and sharing of values and complexity, among others [2].

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The research centers and institutes of the coffee triangle region of Colombia have become allies of companies and organizations and it is from the transfer of knowledge that this collaboration is reflected. In order to establish this collaboration, it was necessary to determine factors, categories and key measurement variables and to design and validate a knowledge transfer model for research centers and institutes. Some of the findings of the study of knowledge transfer are then presented.

This article initially recounts the conceptual aspects related to knowledge transfer, learning and knowledge transfer and the knowledge transfer model for research centers and institutes; the methodology and results are then presented.

This research development is expected to contribute to the topic of knowledge management from knowledge transfer, not only by the use of a complementary model, but also by the findings found in research centers and institutes.

A. Knowledge Transfer

The concept of knowledge transfer is used in knowledge management literature to represent the formally organized activity of transferring knowledge from one source to a recipient within the specific limits of the organization. Unlike knowledge exchange, which takes place through social interactions from the individual and can have different degrees of informality [5].

Additionally, [6] explain that knowledge and knowledge transfer could be defined as the movement of knowledge or technology from one organizational environment to another. A distinction can be made between dissemination (defined as spontaneous, unplanned) and dissemination (directed and planned). There are three basic modes of transfer, as they are:

Non-commercial transfer; seminars, informal contacts, publications, secondments and exchange of personnel and training

Commercial transfer; collaborative research, contract research, consulting, licensing and sale of intellectual property and technical services. Licensing is often considered advantageous, as it allows researchers to continue working on their research, without the need to commit large amounts of time to commercial matters.

New generation of companies; direct spin-offs, indirect spin-offs and technology transfer companies. To facilitate the spin-off process, trainings and activities should be developed to teach entrepreneurs skills in the subject.

Knowledge transfer could be seen as a wave model from hydrodynamics (where it represents waves of water) to acoustics (where it represents waves of sound) to electrodynamics (where it represents waves of light): the peak height of a wave of water, the volume of a wave of sound and the brightness of a wave of light is represented by the same term [7].

They conclude that the transfer of knowledge through the organization transforms organizations into learning organizations. Therefore, the process of knowledge transfer becomes an important factor in the success of organizations that hope to survive and grow [8]. Knowledge transfer is a construction from training and capacity. Knowledge transfer is a crucial component that refers to the interpersonal (or intergroup) or inter-institutional relationship, considering information, know-how, receptivity, transparency, coordination strategies and are based on a combination of skills and information systems (technology) [9].

Some of the main authors define knowledge transfer, as can be seen in the table I.

Autors	Definition
[10]	Knowledge that is acquired in one situation and is applied, or fails to be applied, in another situation
[11]	The process of transfer within an organization is a distinctive experience and not a process of gradual dissemination
[12]	Process through which a unit, whether individual, group, department or division, is affected by the experience of another unit
[13]	Process by which an organization makes knowledge about its routines available to its employees
[14]	Systematic and orderly exchange of information and skills between entities
[15]	Transmission of knowledge directly from a source to a receiver
[16]	The process of turning knowledge into action
[17]	Learning Process
[2]	An important practice that significantly improves a company's competitive advantage through management oversight, incentives, and training programs
[18]	A process by which knowledge is transmitted unidirectionally from academics to external stakeholders, who benefit from using that knowledge for their own purposes

B. Learning and knowledge transfer

According to [19], learning is a mental activity, regulated by the learner, and directly related to the understanding of a subject. Learning is a field whose objective is to maximize the total amount of reward an agent receives while interacting with his environment. This interaction occurs by exploring the space of states through trial and error actions in the environment, [20];

knowledge transfer learning is an important tool insofar as knowledge acquired in a previous situation can be reused as heuristics, accelerating the learning process in the new situation.

It is assumed that a learning task and corresponding data are in a source domain, and a learning task and corresponding data are in an objective domain, the objective of transfer learning is to improve the rate of objective predictive functions [21].

About it, [22], explain that the learning process, together with the nature of its outcome, takes precedence over the choice of a structural mode by which the learning opportunity can be exploited. Culture is an essential factor in collaboration and learning and involves constant interactions between different cultures, which can lead to ambiguity, complexity and resistance of knowledge transfer objectives. Purely supervised learning has achieved admirable achievements compared to unsupervised learning in some specific fields, [23].

Now good, [24], point to the importance of continuing education through learning to generate change in the daily practice of professionals, such as preparation, accessibility, nature of learning resources and impact. It includes the movement of various intellectual resources, including psychomotor skills, competencies and theoretical understandings from the classroom, [25].

[26], explain that organizations learn only through people who learn. Individual learning does not guarantee organizational learning. But without this, there is no organizational learning. Through organizational routines, the individual knowledge learned becomes the knowledge of the organization. Therefore, in these organizations' routines form the basis of collective learning. However, a learning culture must be embedded within the organization in order to achieve learning success.

And in the field of organizations, [27], explains that effective knowledge transfer and therefore networks, learning and resources are required to exploit market opportunities and achieve better performance. The importance of accumulating intangible resources, such as social networks, organizational learning and knowledge management, to improve efficiency is highlighted. Developing organizational learning among employees requires support and a design mechanism, such as entertainment activities to improve mutual trust and share new ideas, exploring the potential of learning to build an effective and enjoyable environment to achieve better knowledge transfer.

In terms of an organization's ability to learn faster, this depends on the ability of individual workers to learn and transfer skills quickly. In addition to having the most appropriate endowment, strategies that improve knowledge transfer among the workforce should be considered to accelerate the learning process, [28]. Knowledge-based societies, lifelong learning is important, and people feel it is imperative to learn and develop continuously, [29].

C. Knowledge transfer model

The study is based on the knowledge transfer model for research centers and institutes of [30], which is grouped into 9 categories as they are: Direction, culture, learning, standards, technologies, networks, services, commercial production and intellectual production, as can be seen in Fig. 1; with its 25 variables: direction, structure, rules, values, climate, orientation, strategy, competencies, roles, methods, information and communication technologies (IT), organizations, research, contracts, alliances, consultancies, training, patents-licensing, entrepreneurship, articles, books, theses, programs and papers.

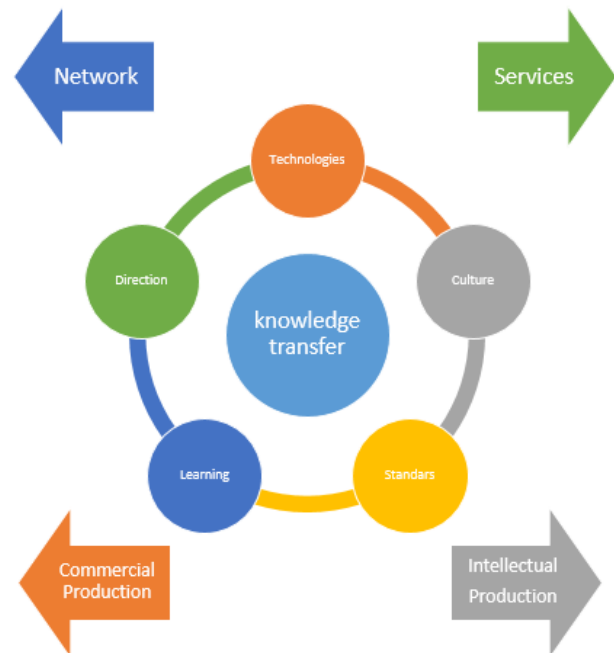


Fig. 1. Knowledge transfer model [30].

II. METHODOLOGY

For the development of the project, a qualitative type of research was collected, in addition to a type of study that combines descriptive, explanatory and correlational, which according to [3], seeks to understand with meanings and a holistic perspective, to understand the set of interrelated qualities that characterize a given phenomenon.

Considering that the population size is 39 research centers and institutes in the region, a survey was applied to all of them, from which a response was obtained from 24 research centers or institutes in the coffee triangle region of Colombia. For the structuring of the questionnaire, questions were formulated on a Likert scale, graded from 1 to 5, where 1 is in disagreement or not carried out, 2 is partially carried out, 3 is carried out at intervals, 4 is carried out regularly and 5 is carried out completely.

For data analysis [4], explain the importance of correlation analysis, which makes it possible to simultaneously evaluate several dependent metric variables comparatively with independent metric variables. The following variables were considered for the presentation of the results:

Learning, which includes:

Orientation: from learning and exploring new ways of working, to transferring knowledge.

The strategy: staff know what knowledge they need to support the knowledge transfer strategy.

Competences: from a management system based on competences, for the transfer of knowledge.

Intellectual production, which includes:

Articles: publication of research articles in national and international indexed journals.

Books: publication of research books or manuals or textbooks

Thesis: publication of master's or doctoral research thesis

Programs: on research results and their contribution to the creation of programs such as specializations, master's degrees, or doctorates or their curricula.

Papers: publication of research results in specialized events such as seminars, congresses and conferences.

Services, which include:

Advisory services: development of advisory services to other organizations.

Consultancies: development of consultancies to other organizations

Trainings: development of specific trainings to other organizations.

III. RESULTS AND DISCUSSION

The learning results for knowledge transfer, in research centers and institutes of the coffee triangle region of Colombia, from the analysis of the variables: orientation, strategy and competences, can be observed in the Fig. 2:

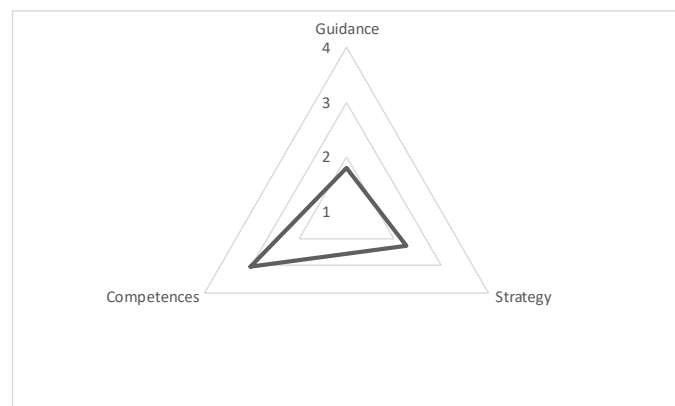


Fig. 2. Learning for knowledge transfer

Of the findings found, the competencies and strategies for knowledge transfer stand out, such as those best evaluated in the research centers and institutes of the Colombian coffee triangle. In contrast, the assessment of orientation is the lowest and this demonstrates the need to reinforce this variable for adequate learning for the transfer of knowledge.

However, in relation to intellectual production and services for knowledge transfer in research centers and institutes in the coffee triangle region of Colombia, from the analysis of the variables: articles, books, theses, programmers, papers, consultancies and training, the results can be seen in Fig. 3:



Fig. 3. Intellectual production and knowledge transfer services

The findings include training and consulting as a result of knowledge transfer, as the best evaluated in the research centers and institutes of the Colombian coffee triangle. In contrast, the valuation of the other variables is very low and the results of the papers and articles are of particular concern, given the nature of these centers, which should have a strong valuation in the measured variables, which makes it necessary to think and execute strategies that allow the results of the transfer to be more visible in academic circles.

However, it is necessary to investigate the existing relationship between learning and the results of knowledge transfer. The findings can be seen in table II:

TABLE II
CORRELATION ANALYSIS

Values	1									
Guidance	,396	1								
Strategy	,548**	,466*	1							
Advisories	-,035	,247	,152	1						
Consultansies	,000	,263	,083	,764**	1					
Trainings	-,025	,188	,054	,842**	,743**	1				
Papers	-,219	,077	,183	-,056	-,068	,050	1			
Books	,175	,041	,362	-,010	-,111	,156	,350	1		
Thesis	-,123	,106	,142	,071	,106	,018	,363	,263	1	
Programs	-,066	,294	,192	-,139	-,250	,130	,525**	,414*	,416*	1
Presentations	,236	,140	,185	,020	-,020	,079	,508*	,432*	,252	,438*

**. The correlation is significant at the level of 0,01 (2 Queues).

*. The correlation is significant at the level of 0,05 (2 Queues).

The findings presented in the correlation table effectively confirm what was presented in the results of the previous graphs and has to do with a very low significance between learning and transfer from intellectual production and services. Situation that makes it necessary to propose plans, programs and projects to improve learning for the transfer of knowledge and that the results are more visible in the framework of the work of a research center or institutes.

This, given that the review of the literature indicates that there is indeed a direct relationship between learning and the transfer of knowledge, an explicit situation by [31], those who found in their research that there are important implications for learning in companies, given the knowledge of them in their daily work;

likewise [14], who explain that knowledge transfer has a direct relationship with learning and applies the knowledge of source domains to improve learning of target domains, which has been developing in recent years, from an optimal method of learning. Likewise [32], which from a proposed learning method managed to verify the positive effect on knowledge and intelligent diagnosis, considering the transfer of knowledge as one of the key factors in this process. In turn [33], assessed learning strategies aimed at understanding and knowledge transfer and found typical characteristics of knowledge in context and coherent from organizational learning. [34], concludes that training, within the framework of learning, is consolidated as an effective tool for acquiring an adequate and lasting level of knowledge over time.

IV. CONCLUSIONS

Knowledge management is a key factor of success in today's organizations, however, knowledge transfer is the factor with which the development of management can be measured with greater efficiency, for this case in the centers and research institutes of the coffee triangle region of Colombia.

The model on which the evaluation and presentation of the findings are based was statistically validated in the 24 research centers and institutes of the Colombian coffee triangle region and the results indicate that it is necessary to redefine aspects of the learning processes and strengthen the results of knowledge transfer.

It is fundamental for a research center and institute to publish the results of its research work, since the nature of that body almost demands that this be a reality, hence the need to rethink what is being done and improve this aspect so important to the academic life of a center and institute.

It is noted in the findings that there are advances in terms of learning for the transfer of knowledge, but this is not reflected in the results of its missionally and in this sense more actions must be taken to allow greater efficiency of the work that is being developed. As observed in the research results of several authors of the last year.

REFERENCES

- [1] W. Rodgers, G. Mubako, and L. Hall, "Knowledge management: The effect of knowledge transfer on professional skepticism in audit engagement planning", *Computers in Human Behavior*, vol. 70, pp. 564-574, 2017. DOI:10.1016/j.chb.2016.12.069
- [2] Y. Liu, Y. Li, L. Hui and T. Liud, "Knowledge transfer in buyer-supplier relationships: The role of transactional and relational governance mechanisms". *Journal of Business Research*, vol. 78, pp. 285-293 2017. DOI:10.1016/j.jbusres.2016.12.024,
- [3] N. Mejía, "Sobre la investigación cualitativa. Investigaciones sociales", 2ª Ed., McGraw Hill, Madrid, pp. 277-299, 2004.
- [4] J.F. Hair, R.E. Anderson, R.L. Tatham, and W. Black, "Análisis Multivariante". Madrid: Prentice Hall, 1999.
- [5] D. Vlajčić, A. Caputo, G. Marzi and M. Dabić, "Expatriates managers cultural intelligence as promoter of knowledge", *transfer in multinational companies*, vol. 25, pp. 1-11, 2018. DOI:10.1016/j.jbusres.2018.01.033
- [6] V. Nilsen and G. Anelli, "Knowledge transfer at CERN", *Technological Forecasting & Social Change*, vol. 112, pp. 113-120, 2016. DOI:10.1016/j.techfore.2016.02.014
- [7] L. Zuchowski, "Modelling and knowledge transfer in complexity science", *Studies in History and Philosophy of Science*, vol 35, pp. 1-10, 2017. DOI:10.1016/j.shpsa.2017.10.003
- [8] W. Rodgers, G. N. Mubako and L. Hall, "Knowledge management: The effect of knowledge transfer on professional skepticism in audit engagement planning", *Computers in Human Behavior*, vol. 70, pp. 564-574, 2017.
- [9] G. Aerts, M. Dooms and E. Haezendonck, "Knowledge transfers and project-based learning in large scale infrastructure development projects: an exploratory and comparative ex-post analysis" *International Journal of Project Management*, vol. 35, pp. 224-240, 2017. DOI:http://dx.doi.org/10.1016/j.ijproman.2016.10.010
- [10] L. Argote and P. Ingram, "Knowledge Transfer: A Basis for Competitive Advantage in firms", *Organizational Behavior and Human Decision Processes*, Vol. 82, No. 1 May, pp. 150-169, available online at <http://www.idealibrary.com>, 2000. DOI:10.1006/obhd.2000.2893
- [11] G. Szulanski, "The process of knowledge transfer: A diachronic analysis of stickiness" *Organizational Behavior and Human Decision Processes*, vol. 82, pp. 9-27, 2000.
- [12] J. Argote, M. Levine and R. L. Moreland, "Knowledge transfer in organizations: Learning from the experience of others". *Organization Behavior Human Decision Processes*, vol. 82, pp. 1-8, 2000.
- [13] Thomas, Kalling, "Knowledge management and the occasional links with performance", *Journal of Knowledge Management*, Vol. 7 Issue: 3, pp. 67-81, 2003. DOI: 10.1108/13673270310485631
- [14] P. Wang, T.W. Tong and C.P. Koh, "An integrated model of knowledge transfer from MNC parent to China subsidiary", *Journal of World Business*, vol 39, No. 2, pp. 168-182, 2004. ScholarBank@NUS Repository. DOI:10.1016/j.jwb.2003.08.009
- [15] B. Renzl, "Trust in Management and Knowledge Sharing: The Mediating Effects of Fear and Knowledge Documentation", *Omega*, vol. 36, pp. 206-220, 2008. DOI:10.1016/j.omega.2006.06.005
- [16] V. Ward, A. House and S. Hamer, "Knowledge brokering: Exploring the process of transferring knowledge into action", *BMC Health Services Research*, vol. 9, pp. 12, 2009.
- [17] Ayse, Saka-Helmhout, "Agency-Based View of Learning within the Multinational Corporation" *Management Learning*, Vol 40, Issue 3, pp. 259 - 274, 2009. DOI:10.1177/1350507609104339
- [18] F. Rossia, A. Rosli and N. Yip, "Academic engagement as knowledge co-production and implications for impact: Evidence from Knowledge Transfer Partnerships" *Journal of Business Research*, vol. 80, pp. 1-9, 2017. DOI:10.1016/j.jbusres.2017.06.019
- [19] I. Glogger-Frey, M. Deutscher and A. Renkl, "Student teachers' prior knowledge as prerequisite to learn how to assess pupils' learning strategies", *Teaching and Teacher Education*, vol. 45, pp. 1-15, 2018. DOI:10.1016/j.tate.2018.01.012
- [20] R. Bianchi, L. Celiberto, P. Santos, J. Matsuura, and R. Mantaras, "Transferring knowledge as heuristics in reinforcement learning: A case-based approach", *Artificial Intelligence*, vol. 226, pp. 102-121, 2015. DOI:10.1016/j.artint.2015.05.008
- [21] G. Sun, L. Liang, T. Chen, F. Xiao and F. Lang, "Network traffic classification based on transfer learning" *Computers and Electrical Engineering*, pp. 1-8, 2018.
- [22] A., Ado, Z. Su, and R. Wanjiru, "Learning and Knowledge Transfer in Africa-China JVs: Interplay between Informalities, Culture, and Social Capital", *Journal of International Management* vol. 23, pp. 166-179, 2017.
- [23] L. Duan, Q. En, Y. Qiao, S. Cui and L. Qing, "Deep feature representation based on privileged knowledge transfer", *Pattern Recognition Letters*, pp. 1-9, 2017.

- [24] M. Lahti, R. Kontio, A. Pitkänen and M. Välimäki, "Knowledge transfer from an e-learning course to clinical practice", *Nurse Education Today*, vol. 34, pp. 842–847, 2014. DOI:10.1016/j.nedt.2013.09.003
- [25] R. Booth, C. Scerbo, B. Sinclair, M. Hancock, D. Reid and E. Denomy, "Exploring learning content and knowledge transfer in baccalaureate nursing students using a hybrid mental health practice experience", *Nurse Education Today*, vol. 51, pp. 57–62, 2017. DOI:10.1016/j.nedt.2017.01.006
- [26] K. Werner, G. Dickson and K. Hyde, "Learning and knowledge transfer processes in a mega-events context: The case of the 2011 Rugby World Cup", *Tourism Management*, vol. 48, pp. 174–187, 2015. DOI:10.1016/j.tourman.2014.11.003
- [27] S. L. Chih-Hsing, "Examining social capital, organizational learning and knowledge transfer in cultural and creative industries of practice", *Tourism Management*, vol. 64, pp. 258–270, 2018. DOI:10.1016/j.tourman.2017.09.001
- [28] D. Nembhard and F. Bentefouet, "Selection, grouping, and assignment policies with learning-by-DOIng and knowledge transfer", *Computers & Industrial Engineering*, vol. 79, pp. 175–187, 2015. DOI:10.1016/j.cie.2014.11.006
- [29] J. Moskaliuk, F. Bokhorst, and U. Cress, "Learning from others' experiences: How patterns foster interpersonal transfer of knowledge-in-use" *Computers in Human Behavior*, vol. 55, pp. 69–75, 2016. DOI:10.1016/j.chb.2015.08.051
- [30] C. Marulanda, O. Bedoya and H. Quintero, "Modelo de transferencia de conocimiento para centros e institutos de investigación", *Espacios*, vol. 39, No. 15, pp. 1–20, 2018.
- [31] M. Annapoomima, B. Wang, C. Kah-Hin, "The role of knowledge base homogeneity in learning from strategic alliances", *Research Policy*, Volume 47, Issue 1, pp 158–168, ISSN 0048-7333, 2018. DOI: 10.1016/j.respol.2017.10.005
- [32] J. Jiang, and J. Xie, C. Zhao, S. Jia, Y. Guan and Q. Yu, "Max-Margin Weight Learning for Medical Knowledge Network. *Computer Methods and Programs in Biomedicine*, Issue 156, pp 179–190, 2018. 156. DOI: 10.1016/j.cmpb.2018.01.005
- [33] I. Glogger-Frey, Y. Ampatzidis, A. Ohst and A. Renkl, "Future teachers' knowledge about learning strategies: Misconceptions and knowledge-in-pieces", *Thinking Skills and Creativity*, vol. 28, pp. 41–55, 2018. ISSN 1871-1871, (<http://www.sciencedirect.com/science/article/pii/S1871187118300300>), <https://doi.org/10.1016/j.tsc.2018.02.001>
- [34] M.L. Fraga-Sampedro, "Simulation as a learning tool for continuing education on cardiorespiratory arrest", *Enfermería Intensiva*, vol. 29, No. 2, pp 72–79, 2018. DOI: 10.1016/j.enfi.2017.10.003



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