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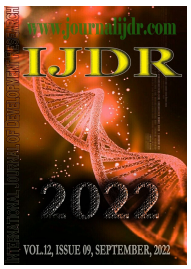

REVIEW ARTICLE

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USE OF MIND AND CONCEPT MAPS IN TEACHING-LEARNING: A REVIEW

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ABSTRACT

Introduction: The training of health professionals has undergone major transformations in recent years, especially guided by the most recent Curricular Guidelines. Within the educational context we must create and use innovative strategies in an attempt to improve meaningful learning. Among them, we have the Mental Maps and Conceptual Maps, which have been gaining space in the most diverse areas, favoring the teaching-learning binomial combined with active methodologies for the acquisition of competences. ***Objective:*** To review this subject to gain knowledge from the entire scientific community and aid in the learning of students in training. ***Methods:*** A narrative review was carried out based on the search for articles in the main databases to review the proposed theme. ***Results and Discussion*:** The mental and conceptual maps are teaching strategies that can be used in the most diverse levels of education with the gain of competences. ***Conclusions:*** Mental and conceptual maps prove to be effective learning strategies in several areas of knowledge and regardless of educational level. The practice of organizing and integrating various concepts during the construction of mental and conceptual maps facilitates understanding by the schematic model of easy visualization.

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INTRODUCTION

Traditionally, the training of the most diverse students, including professional training, has been based on conversational methodologies. Knowledge in this type of methodology has a cumulative character, with the teacher being the entity responsible for transmitting knowledge and the student presenting himself as a listener and holder of passivity(COTTA, *et al*., 2015; STABENOW, *et al*., 2015). Recently, with regard to health education, in higher education, the Law of Directives and Bases of National Education suggested that training institutions change their pedagogical practices in an attempt to change professional training, bringing it closer to social reality, in addition, it proposed that Educational Institutions seek to motivate their faculty and students to build new networks of knowledge, as a way of changing professional training (BRASIL, 2014). As a way of reducing passivity, introspection and conservatism, there was a need to institute new techniques in the teaching-learning process, based on active methodologies, since these provide the development of critical and reflective capacity in relation to what they are doing with the aim of promoting proactivity; link with reality; development of opinion judgment, in addition to the interventionist capacity (BONWELL, *et al*., 1991; ALBUQUERQUE FILHO, *et al*., 2020). Problem-based education with the construction of mental and conceptual maps is an alternative that seeks to promote more dynamic classes, which allow the active participation of students and teachers (ALBUQUERQUE FILHO, *et al*., 2020; ARAÚJO, *et al*., 2015). Concept maps are an important and innovative educational tool, as they improve academic training (DANTAS, *et al*., 2018; GOMES, *et al*., 2021; MOREIRA, *et al*., 2013). Its objective is to establish relationships between concepts and systematize knowledge, thus benefiting Higher Education studies in different ways, such as: promoting the learning of taught content, developing critical thinking and problem solving (MACHADO, *et al*., 2019). Mental maps, on the other hand, allow to enhance the construction of knowledge, through the registration of thought in a creative and non-linear way of organizing the proposed information, allowing to work the essence of a concept in a clearer, more objective, direct and simple way (OKADA, 2018). In this sense, it is necessary to deepen the study of active methodologies in the teaching-learning process of students, discussing their use today. Thus, the present study aims to analyze the scientific production on the use of mental and conceptual maps in health education.

METHODS

This work consists of a narrative review on the use of mind maps and conceptual maps in student education, with the objective of describing the use of these tools in meaningful learning, through the analysis and interpretation of texts found in the current scientific literature.

The descriptors used for this search were “active methodology”, “problematization”, “mind maps”, “conceptual maps”, “teaching/learning”. Articles indexed in the following databases were used: Latin American and Caribbean Literature on Health Sciences (LILACS), National Library of Medicine (MEDLINE), Scientific Electronic Library Online (SCIELO) and PUBMED. We considered as inclusion criteria works published in Portuguese and English, national and international journals, ranging from original works to literature reviews and experience reports. After this step, the authors read the articles found, taking into account the inclusion criteria adopted for the construction of the following text.

RESULTSAND DISCUSSION

Concepts Maps: Active teaching-learning methodologies present strategies that make the student the protagonist figure while the teacher acts as a facilitator so that the student, in the face of the problem situation, researches and reflects reaching the objectives proposed by him/herself (ARAÚJO, *et al*., 2015; DANTAS, *et al*., 2018). Concept maps have several teaching applications, both for teachers and students. For teachers, they can help teach a new topic, reinforce explanation, analyze curricula, organize content, and assess learning. For students, maps can be used to take notes, exchange ideas, solve problems, plan studies, synthesize a text, prepare for assessments, present work and identify integration between topics. In this way, concept maps play an important role when used as assessment tools (DANTAS, *et al*., 2018). Concept maps can be used at the most diverse levels of education, from elementary to higher education, allowing the recognition of different arrangements of the same content, since each map had unique characteristics, being motivated by the characteristic of each student who made it (ROCHA, *et al*., 2016). In early childhood education, the use of concept maps was also observed in a study that inserted this methodology in students of the 3rd year of elementary school, which concluded that the stimulated students were able to organize the proposed content in an organized way, helping them in the knowledge structuring (GODOY, 2017). According to studies carried out, it was observed that students developed greater critical thinking skills when compared to those of traditional education. In addition, there was an improvement in the conceptual maps deduced by the increase in the average scores from the identification and integration of scientific knowledge of medicine clinic in addition to greater complexity. Furthermore, students in this study needed to work as a team, interact with other professionals, as well as provide feedback, showing that learning using concept maps leads students to achieve multiple educational goals (SLIEMAN, *et al*., 2019).

The methodology of concept maps was applied to 120 undergraduates enrolled in the discipline of Anatomy in the courses of Physiotherapy and Occupational Therapy, this study showed that the construction of concept maps motivated students to study regularly, helping them to understand the disciplines, promoting contextualization. of knowledge (SILVA, *et al*., 2018). The collaborative construction of conceptual maps also showed benefits in health professionals from the approach of the symptoms of patients that allowed an atmosphere in which the students became more involved in the discussion, in addition to inciting individual and collective responsibility to understand the pathophysiological foundations of the integrating symptoms. them to clinical knowledge and suggestion of other diagnostic hypotheses, thus reinforcing clinical reasoning (PENUELA-EPALZA, *et al*., 2018). With regard to the introduction of this methodology in graduate students, it also brought benefits, since the use of concept maps by students could corroborate for the construction of knowledge, making the activities more attractive and interesting in contradiction to the mechanical learning of traditional classes (GEREVINI, *et al*., 2015). The analysis of groups of medicine professors in the construction of concept maps showed the integration of basic and clinical cycles. From this analysis, it can be concluded that such integration was influenced by two main factors: the number of members within the group, those with more people, making decision-making difficult; beyond the level of specialization those who had the same level seem more promising (VINK, *et al*., 2015).
In addition to the ability to reinforce critical thinking and exchange of ideas, concept maps can be an indicator of students who are in academic difficulty and can be used as a starting point for individual learning habit discussion, as well as helping students to visualize where they need to improve. In addition, they can be used to assess how students view the perspective for the curriculum as a way of making improvements to it (BARBARA, *et al*., 2015). The use of programs for the elaboration of concept maps can be used to facilitate the construction process. However, several students point out that the initial obstacles such as the mastery of the creation program and the map construction technique. This fact demonstrates the importance and need for technical training in the use of conceptual maps in order to enjoy its benefits (BARBARA, *et al*., 2015; CHUA, *et al*., 2015). In addition to the difficulty in the process of technological integration, students also have other limitations in the process of creating concept maps, such as: establishment of concepts and connections; lack of time for elaboration and students' resistance to perform them. Thus, it is worth emphasizing the importance of preparing students in order to teach them the step by step of carrying out the method, as well as promoting activities that allow the student to practice what was taught. (AGUIAR, 2012).

Minds maps: Mind maps are also ways of recording information, which allow you to externalize what is going on in the mind in an organized way and in an attempt to make the most of mental abilities, in an organized way, facilitating the recall of the information contained (ARAÚJO, *et al*., 2018; MACHADO, *et al*., 2019). The central theme is the subject that originates the map and its contents are arranged in topics and subtopics, as a hierarchical form, from comprehensive concepts to more specific points (MACHADO, *et al*., 2019). According to Vilela, author of the book Models and Methods for using maps mental maps (2008), there are several applicability of mental maps such as in daily life, management, activities, teaching and personal evolution, as it permeates areas such as learning, self-knowledge, planning and creativity (BUZAN, *et al*., 1996). The use of maps has the great advantage of teaching extensive and tiring contents in a way where they are explained through the main points, this makes the student memorize what is really important to their learning (FURTADO, *et al*., 2016). The brain has the capacity for various types of intelligence such as sensory, emotional, physical, rational, numerical, writing, creativity and verbal. The use of mind maps stimulates different types of reasoning, so it sharpens active learning and creativity through colors, images and keywords, facilitating the understanding and fixation of the themes worked on the maps (VILELA, 2008). The use of colors and images allows visual intelligence to generate greater understanding of the subject addressed, since both adults and children are attracted by visual resources, being an efficient way to add the necessary attention and learning to maps (KEIDANN, 2013; ALMEIDA, *et al*., 2017).

In the development of the activity, students can be questioned as a way of promoting reflections and on the possibility of solutions to the problems encountered during the elaboration of the mental maps, attributing new meanings to learning (SANTOA, *et al*., 2017). Regarding the use of mental maps by academics in the health area, they act as facilitating instruments that provide a resolute care plan focused on the real needs for learning about the contents involved (AMTHAUER, *et al*., 2019). Mental maps can be useful in the doctor-patient approach to concisely explain the most prevalent diseases in society, based on the concept, causes, treatment, prevention measures and symptoms, creating a metalanguage in order to make it easier for the patient to understand (JIMENEZ, 2018). During the COVID-19 pandemic, the use of mental maps became more present in the daily lives of students, as emergency remote teaching was the only alternative for transmitting knowledge, especially during the lockdown period. The use of this method constituted an attractive and different way of learning the content taught online, which contributed to the teaching-learning process, as it brought a critical look at the subjects through unique and creative interpretations (LIMA, 2019; KENSKI, 2013; BRETEMITZ, *et al*.,

2006). Mental maps make an important contribution to the teaching-learning process in the training of health professionals, since in this area it is necessary to develop critical thinking through problem solving and decision making, bringing consequences for communication, diagnosis and treatment. of patients, since the student will establish a network of connections between the theoretical knowledge of a real problem (AKISANYA, *et al*., 2004).With the wide use of mind maps as a new teaching methodology, it was noticed that the evaluation method needs a new look, since there is a need for maps to make the student approach in an organized way a content covered in a degree of own detail (MORANDINI *et al*., 2020). The use of mind mapping software has been a great tool to assist in production due to the visual aspects being quickly recognized and the ease of reorganizing topics and subtopics during the phases of the creation process, thus facilitating the creative process (CARVALHO, 2013; DAMASCENO, *et al*., 2019; LIMA, *et al*, 2017). However, there are limitations that permeate the process of using the software, such as: cost of some applications, technical difficulty and ability to execute the applications, restriction of some application functions. In this way, it is necessary to guide and train students to use these software for better use of the resource and student learning (OLIVEIRA, *et al*., 2020; SECKMAN, *et al*, 2020).
In addition, there is a need for a didactic change, since students are still evaluated in a traditional way, as students are not trained to approach this type of methodology, thus, there is an evaluation with margins of uncertainty and in an incoherent way (PEREIRA, *et al*., 2021; CARVALHO, *et al*., 2011).

CONCLUSIONS

During the educational training of students, there is contact with various information, terms and concepts that are fragmented, thus making it difficult to understand the subject. The teaching-learning cognitive processes are diverse, with this, it is understood that the use of tools needs to be diversified, leaving aside the traditional lecture, making the student the main source of their knowledge. Mental and conceptual maps proved to be effective learning strategies in several areas of knowledge and regardless of education level. The practice of organizing and integrating various concepts during the construction of mental and conceptual maps facilitates understanding by the schematic model of easy visualization. In addition, when the construction of maps is worked on as a team with the participation of other students and teachers, the critical capacity, the discussions and the sharing of information facilitate the understanding of the subject, in addition to fostering teamwork and providing feedback in order to maintain student involvement, clarify doubts and correct mistakes. The use of maps presents some obstacles to students, such as difficulty in organizing concepts and connections, causing some resistance from students, as well as the use of technologies that help in this context. As well as teachers, who have difficulties in the evaluation process maps. Such aspects need to be considered and indicate the importance of carrying out an initial training to clarify constant doubts of students and teachers, clarifying the importance of the method and its benefits in learning. In this way, it can be seen that mental and conceptual maps contribute to the development of important skills, and should be stimulated in the teaching-learning process of students from elementary school to higher education.

REFERENCES

Aguiar, J.G. 2012. Desenvolvimento e Validação de um Questionário para Avaliar o Nível de Conhecimento dos Alunos sobre Mapas Conceituais. 91f. Dissertação (Mestrado em Ensino de Ciências). USP. SÃO PAULO.

Akinsanya, C., Williams, M. 2004. Concept mapping for meaningful learning. Nurse Educ Today; 24:41–6.

Albuquerque Filho, E.T., Cavalcante, L.M.M., Cavalcante, K.M.M., Jatobá, M.A.V., Sanata, E.C. 2020. Aplicação de metodologias ativas de ensino no estudo da anatomia humana frente ao modelo tradicional. BrazilianJournalof Health Review;3(2): 1457-1464.

Almeida, L.S., Freitas, S.H.Z. 2017. Mapa mental e o ensino jurídico: uma forma visual de efetivar o conhecimento científico no curso de direito. Revista de Sociologia, Antropologia e Cultura Jurídica;3(1).

Amthauer, C., Rosa, I.K., Morschbacher, J.A. 2019. Utilização do mapa mental no aprendizado dos acadêmicos de enfermagem: relato de experiência. Anuário Pesquisa e Extensão Unoesc São Miguel do Oeste, *[S. l.]*; 4: e23276.

Araújo, A.L.R., Ramos, M.A.S. 2018. Percepções sobre as potencialidades do uso de mapas conceituais na formação pós-graduada: um estudo com oficiais na Academia de Polícia Militar do Maranhão. PROJEÇÃO E DOCÊNCIA;9(2): 225-240.

Araújo, R.M., Frigotto, G. 2015. Práticas pedagógicas e ensino integrado. *Revista Educação Em Questão*;*52*(38): 61-80.

Barbara, E.C., Knollmann-Ritschel, U.S.N., Steven, J.D. 2015. Using Concept Maps in a Modified Team-Based Learning Exercise, Military Medicine; 180(4): 64–70.

Bonwell, C.C., Eison, J.A. 1991. Active Learning; Creating Excitement in the Classroom. ASHE-ERIC Higher Education Report No. 1. Washington, D.C.: The George Washington University.

BRASIL 2014. Lei de Diretrizes e Bases da Educação Nacional, LDB. 9394/1996.

Breternitz, V.J; Almeida, M.I.R.; Ercolin, C.A.; Sacramento, J.M.N. 2006. Técnica de construção de cenários e uma aplicação do método GBN. Anais. São Paulo: EAD/FEA/USP.

Buzan, T., Buzan, B. 1996. The Mind Map Book, Plume, 2a. edição, 320 p.

CARVALHO 2013. O programa de bolsa de iniciação à docência - pibid: contribuições e limites no âmbito dos cursos de formação inicial.

Carvalho, A.M.P., Gil-Peréz, D. 2011. Formação de professores de Ciências: tendências e inovações. 10. ed. São Paulo: Cortez.

Chua, A.Z.E., Lo, D.Y.K., Ho, W.H.H., Koh, Y.Q., Lim, D.S.Y., Tam, J.K.C., *et al.* 2015. The effectiveness of a shared conference experience in improving undergraduate medical and nursing students' attitudes towards inter-professional education in an Asian country: a before and after study. *BMC Med Educ*;15: 233.

Cotta, R.M.M., Costa, G.D., Mendonça, E.T 2015. Portfólios crítico-reflexivos: uma proposta pedagógica centrada nas competências cognitivas e metacognitivas. Interface -Comunicação, Saúde, Educação, [s.l.]; 19(54): 573-588

Damascena, S.C.C., Santos, K.C.B., Lopes, G.S.G., Gontijo, P.V.C., Paiva, M.V.S., Lima, M.E.S., *et al*. 2019. Uso de tecnologias educacionais digitais como ferramenta didática no processo de ensino-aprendizagem em enfermagem. BrazilianJournalof Development;5(12). 29925-29939. 10.34117/bjdv5n12-131.

Dantas, M.P., Silva, F.U., Borges, J.C.S. 2018. Uso dos mapas conceituais como ferramenta de avaliação qualitativa, com ênfase no ensino de Física. HOLOS, [S, I.];3:186-200. ISSN 1807-1600.

Furtado, G.D., Farias, L.A., Duarte, G.D. 2019. Mapa mental e a disciplina de imunologia animal na perspectiva da psicopedagogia em medicina veterinária: revisão literária. ENVIRONMENTAL SMOKE; 2: 52-61. 10.32435/envsmoke.20192352-61.

Gerevini, A.M., Trindade, T.R., Marchi, M.I., Martins, S.N., Strohschoen, A.A.G. 2015. As metodologias ativas de ensino e de aprendizagem em cursos de pós-graduação: o uso dos mapas conceituais. Revista Eletrônica Sala de Aula em Foco-ISSN 2316-7297;3(2).

Godoy LM 2017. O uso dos mapas conceituais no 3o ano do ensino fundamental I. Santa Catarina (Joinville). Trabalho de Conclusão de Curso. Universidade Federal de Santa Catarina.

Gomes, A.P., Coelho, U.C.D., Cavalheiro, P.O., Batista, R.S. 2021. O papel dos mapas conceituais na educação médica. Revista Brasileira de Educação Médica;35(2): 275-282.

Jimenez L. 2018. Mapas mentais e seus usos para explicar diferentes doenças. 10.13140/RG.2.2.27956.76167.

Keidann G. 2013. Utilização de mapas mentais na inclusão digital. In: Encontro de Educomunicação da Região Sul, 2., Ijuí. Anais,

Kenski, V.M. 2013. Tecnologias e ensino presencial e a distância. Campinas, SP: Papirus. 160p

Lima, C.F. 2019. Os mapas conceituais na autoavaliação da aprendizagem (Dissertação de mestrado). Universidade Estadual de Londrina, Centro de Educação, Comunicação e Artes, Londrina.

Lima, J.L.O., Manini, M.P. 2017. Metodologia para Análise de Conteúdo Qualitativa integrada à técnica de Mapas Mentais com o uso dos softwares Nvivo e FreeMind. Informação & Informação, [S.l.]; 21(3): 63-100. ISSN 1981-8920.

Machado, C.T. & Carvalho, A.A. 2019. Os efeitos dos mapas conceituais na aprendizagem dos estudantes universitários. ETD-Educação Temática Digital; 21(1): 259-277.

Morandini, D.C.W., Leite, M.G.L.M. 2020. Mapas mentais e ensino remoto. Anais do Encontro Virtual de Documentação em Software Livre e Congresso internacional de Linguagem e Tecnologia Online; 9(1). ISSN 2317-0239.

Morandini, D.C.W., Leite, M.G.L.M. 2020. Mapas mentais: experiências no ensino remoto emergencial universitário de licenciatura plena em matemática. Anais do Encontro Virtual de Documentação em Software Livre e Congresso internacional de Linguagem e Tecnologia Online; 9(1). ISSN 2317-0239.

Moreira, M.A. 2013. Aprendizagem significativa, organizadores prévios, mapas conceituais, diagramas V e unidades de ensino potencialmente significativas. Curitiba. (Material de apoio para o curso Aprendizagem Significativa no Ensino Superior: Teorias e Estratégias Facilitadoras). PUCPR, Curitiba.

Okada, A. 2018. O que é cartografia cognitiva e por que mapear redes de conhecimento. In A. Okada. Cartografia cognitiva: mapas do conhecimento na pesquisa, aprendizagem e formação docente (pp. 37-65).Cuiabá: Editora KCM.

Oliveira, T.M.R.; Amaral, C.L.C. 2020. Aplicativo MIMIND: a construção do mapa mental no ensino de ciências na pandemia COVID-19. Anais do CIET:EnPED:2020 - (Congresso Internacional de Educação e Tecnologias | Encontro de Pesquisadores em Educação a Distância), São Carlos. ISSN 2316-8722.

Penuela-Epalza, M., DelaHoz, K. 2018. Incorporation and evaluation of serial concept maps for vertical integration and clinical reasoning in case-based learning tutorials: Perspectives of students beginning clinical medicine. Med Teach [Internet]. Taylor & Francis;0(0):1–8.

Pereira, N.R., Medeiros, S.L., Nascimento, J.A. 2021. Concept maps as strategies in remote learning and the challenges of students in this modality in the Integrated Technical Course in Agriculture at IFMG - Campus Bambuí. Research, Society and Development, *[S. l.]*; 10(9): e34610917284. DOI: 10.33448/rsd-v10i9.17284.

Rocha, C.E., Spohr, C.B. 2016. O uso de mapas conceituais como instrumento didático para identificar indícios de aprendizagem significativa em diferentes níveis de ensino. Investigações em Ensino de Ciências;21(3): 23–52.

Santos,F.S., Gonçalves, R.O., Avelar, M.F. 2017. O uso das tecnologias educacionais como ferramenta didática para a formação de professores da educação básica. Seminário Gepráxis; 6(6): 1251-1262.

Seckman, C., Van de Castle, B. (2021). Understanding Digital Health Technologies Using Mind Maps. J NursScholarsh. Jan;53(1):7-15. doi: 10.1111/jnu.12611. PMID: 33259152.

Silva, J.H., Foureaux, G., Sá, M.A., Schetino, L.P.L., Guerra, L.B. 2018. O ensino-aprendizagem da anatomia humana: Avaliação do desempenho dos alunos após a utilização de mapas conceituais como uma estratégia pedagógica. Ciência & Educação (Bauru);24(1): 95-110.

Slieman, T.A., Camarata, T. 2019. Case-Based Group Learning Using Concept Maps to Achieve Multiple Educational Objectives and Behavioral Outcomes. J Med Educ Curric Dev.;6:1-7.

Stabenow, R.S.C., Magalhães, C. 2015. Portfólio como instrumento de avaliação formativa: a análise do processo no CMEI Valéria Veronesi. [Apresentação no XVI Congresso da Educação e VI Simpósio de pesquisa e pós-graduação em educação; Londrina, Brasil].

Vilela, V.V. 2008. Modelos e Métodos para Usar Mapas Mentais, e-livro, Amostra Grátis, 4ª. Edição, 259 p.

Vink, S.C., Tartwijk, J.V., Bolk, J., Verloop, N. 2015. "Integration of clinical and basic sciences in concept maps: a mixed-method study on teacher learning." *BMC Medical Education*;15(1): 1-11.

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