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Acrostics and Crosswords as Advance Organizers to Meaningful Learning in Medical Education

Bruno Massayuki Makimoto Monteiro[1], Ben Hur Vitor Silva Ono[2], Eduardo de Sousa Martins e Silva[3], José Carlos Souza[1]

[1]Universidade Estadual de Mato Grosso do Sul (UEMS), Campo Grande, Brazil
[2]Universidade para o Desenvolvimento do Estado e da Região do Pantanal (Uniderp), Campo Grande, Brazil
[3]Universidade Federal do Triângulo Mineiro (UFTM), Uberaba, Brazil
Email: brunoftmakimoto@hotmail.com, benhur_ono@hotmail.com, eduardosousa25@gmail.com, josecarlossouza@uol.com.br

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Abstract

Education plays an essential role in human development. More than a simple process of just passing knowledge, is a dynamic social phenomenon. Thanks to it, the individual becomes more critical and understands better the reality that surrounds him. Consequently, the transformation is possibilited. Similarly, the strategies used to teach are fundamental to make better use of the teaching-learning process. Thus, this article aims to analyze the use of teaching methods in medical colleges associated with acrostics and crosswords as advance organizers. An integrative bibliographic review was carried out using scientific articles from the last fifteen years, from PubMed databases.

Keywords

Medical Education, Learning, Teaching Method, Knowledge, Problem Based Learning

1. Introduction

Full learning is composed of a dynamic, dialogical and democratic system; it involves the integration of the various sensorial processes of the human body. Psychic-cognitive functions integrate with executive functions and others, whether intellectual or psychomotor (Dias-Lima et al., 2019; Gomes et al., 2007). The more the senses are used the better the learning will be; likewise, the more the didactic resources used the greater the teaching-learning course (Joseph et al., 2016; Gomes et al., 2007; Gotardelo et al., 2017). According to Aurélio Dictionary, learning is

acquiring new knowledge and self-education (Ferreira, 2013). It is, therefore, an active and not passive method, being a two-way path, in which apprentice and his tutor complement each other in this procedure (Dias-Lima et al., 2019).

Following this argument, traditional medical formation has been questioned (Dias-Lima et al., 2019; Gomes et al., 2007; Gotardelo et al., 2017; Joseph et al., 2016). Therefore, new methodological proposals were created (Dias-Lima et al., 2019). For example, according to recent studies, medical schools have used Problem Based Learning (PBL), given that, unlike the old teaching methodology, the new way of teaching places the student in an active and responsible role, and can result in higher academic performance (Borochovicius & Tortella, 2014; Dias-Lima et al., 2019; Cavalcanti, 2005; Preeti, Ash-ish, & Shriram, 2013). In this perspective, play and playthings proved to be an important tool for optimizing knowledge acquisition, since, such as PBL, students establish a more positive relationship with learning, thus making them more motivated to learn (Dias-Lima et al., 2019; Daltro & Bueno, 2010; Moreira, 2013).

Thereby, this study aims to present some ways of meaningful learning, in the context of active methodologies and play and playthings in medical education, through the proposal to use previous observatories, such as acrostics and crosswords.

2. Teaching and Medical Education

2.1. Medical Formation and Meaningful Learning

The current National Curricular Guidelines (NCG) for medicine academic course (Borochovicius & Tortella, 2014; Dias-Lima et al., 2019; Brasil, 2014) establish that these have as teaching methods some of the several active learning methodologies. Among these, the most well-known are Problem-Based Learning (PBL), Team-Based Learning (TBL), Problematization, inverted classroom and Project-Based Learning. They aim at a teaching-learning process that has the student as the protagonist of their learning; the teacher has the role of facilitator. These work with the development of autonomy, resolution, personal resourcefulness, empathy, confidence, responsibility, collaborative teamwork, critical sense, among other pillars. Their objective is to train ethical, reflective, critical and human professionals (Borochovicius & Tortella, 2014; Dias-Lima et al., 2019).

In this context, it is intended that learning is as meaningful as possible, making the student happy to study and actually learn to learn, know how to make decisions, solve problems and participate, democratically and dialogically, in their medical training. According to psychiatrist David Ausubel, author of the Theory of Meaningful Learning (TML), this is configured as a formal teaching strategy, in which the student interacts and integrates, in a non-hegemonic way, new knowledge with his previous knowledge, called subsumers by Ausubel. These two knowledges become relevant in the learning process; from various forms of interaction, which for the student was hitherto a subsumer, progressively acquires new meanings. What, previously, could not have as much mean-

ing when in isolation, now becomes more differentiated, polished and able to serve as a lever for new meaningful learning. For TAS, the social representations of the learner and their knowledge serve more than to identify contents, concepts and ideas, but rather their physical, cultural and social totality, through their verbal and non-verbal language, affections and cognition. On the other hand, the teacher must be receptive to an existential and holistic view of the student, not only intellectual (Agra et al., 2019).

Parallel to Ausubel, there are the ideas of Vygotsky, a Russian psychologist with a background in medicine and law, who described the incisive socio-cultural interaction of knowledge and learning. He demonstrated that there is a historical and social character of the human mind and the possibility of this intervening in its cognitive and affective development. Therefore, in their medical education, the young person has contact with different cultures, new environments, opinions, philosophies, diversity of knowledge and postures; if he knows how to utilize the best of all this provides, he will have his learning as eclectic, human and promising as possible (Cavalcanti, 2005).

In the same direction, Jean Piaget's ideas corroborate a playful and convincing teaching-learning course, in order that new generations can utilize their manual and technological skills for their own benefit. According to this Swiss researcher, the process of structuring the psychic intelligence function happens in childhood, from how the child works internally; *i.e.*, triggered through its interactions with his outside world. The child would go through stages of incorporation of an external element, such as some object or an event, through a sensory-motor scheme. According to Piaget, this object or event offers resistance to being assimilated; because of this, ludic learning would be one of the ways to mitigate these resistant sources and facilitate learning (Pontes, Rego, & Silva Junior, 2006). In medical education, play and playthings have the same importance in this context, since the age group involved is usually young.

2.2. Teaching-Learning, Play and Playthings and Advance Organizers

Based on these questioning ideas about the pedagogical process, new forms of teaching were proposed, naming them as Teaching-learning. According to Dias-Limas and collaborators, in traditional teaching, there is a vertical relation between teacher and student, thus favoring the formation of a passive and intellectually dependent student. However, teaching-learning promotes, as a new educational paradigm, the active teaching methodologies that rewrite the positions of teachers and students. If previously these were given in a hierarchical and austere way, now they become horizontal, that is, the relationship becomes dialogical, having as its center the student who assumes an active and responsible role, while the teacher is a facilitator (Agra et al., 2019).

Aiming at the proof of teaching-learning, the medical faculties not only tested, but have also adopted active methodologies as an integral part of their curriculum, especially using Problem-Based Learning (PBL) (Cavalcanti, 2005). Some

studies have corroborated the fact that students from this new system have presented higher performances when compared to the old teaching methodology (Borochovicius & Tortella, 2014; Cavalcanti, 2005; Dias-Lima et al., 2019; Preeti, Ashish, & Shriram; 2013). According to certain research, students from PBL show higher academic performance and provide better services; one of the justifications is that active methodologies contribute to the development of critical thinking, responsibility, time management, information sharing and problem solving capacity. Thus, the student becomes more able to acquire characteristics that offer both a more productive work and a greater capacity for communication, either by relating to members of a team or with the community, or by leading groups (Cavalcanti, 2005; Dias-Lima et al., 2019; Preeti, Ashish, & Shriram, 2013).

Within this scope of teaching-learning, several learning methodologies are contained, and among them, play and playthings can be cited. Characterized by being a means of acquiring knowledge that occurs with the use of films, games and comic magazines, the ludic is positively accepted among students (Dias-Lima et al., 2019; Daltro & Bueno, 2010). According to some studies, by using this pedagogical practice, positive reinforcement is favored in students, to the extent that, integrating and facilitating the process, the issues involved with communication, expression, self-esteem, creativity are harmonized, besides encouraging the externalization of various types of emotions (anguish, passions, joys, sorrows, aggressiveness and passivity). Thus, disciplinary austerity, ended in the student daily life, gives way to moments of relaxation and relief of stress, contributing to a better learning environment (Cavalcanti, 2005; Dias-Lima et al., 2019; Daltro & Bueno, 2010).

Other studies have also evaluated this ludic approach (Dias-Lima et al., 2019; Daltro & Bueno, 2010; Gotardelo et al., 2017). In the work of Dias-Lima and collaborators, e.g., the students chose some form of creative presentation (such as parodies, Cordel literature, simulation of television programs, among others) to deal with some topics drawn within the medicine panorama (Dias-Lima et al., 2019). Added a research (Gotardelo et al., 2017) in which the students had to stage a Role-play, according to a topic of pharmacology previously studied by them. The findings of these two studies showed that, as the students had to interpret, relate and create a new content, taking into account a new context; a greater relation between basic contents in medical education could be visualized; therefore, not only knowledge, but also behavioural skills were acquired with this methodology. In addition, it was also verified that one of the greatest difficulties faced by health educators is to keep their students focused and motivated during classes. When using these tools, the students reported being more concentrated and involved not only mental but also psychologically, given that a more positive educational environment was built.

Also, in relation to play and playthings, the work of Daltro & Bueno evaluated an educational experience in which students integrated their knowledge and experiences about human development, based on a discipline called Life Cycle De-

velopment (LCD). This happened with the study of the psychological processes of the individual from pregnancy to aging, establishing a connection with their own experiences. To this end, several ludic tools (movies and games) were used to make the pedagogical experience more interesting. In fact, it was found that, through play and playthings, it was possible to create a more positive environment; it was added that the ludic is part of the dynamics of life and, when using this process, learning is favored. By integrating psychosomatic attributes of the activity with know-how, the individual had to improve and request their knowledge-thinking, focusing on the outcome of the proposed exercise; this integrality, in the Ausuberian view, is essential to give meaning to the acquired knowledge (Daltro & Bueno, 2010).

When discussing this theme of meaningful learning, whose origin refers to the constructivism of Piaget and other theorists such as Vygotsky (Taylor & Hamdy, 2013), it is essential to keep in mind that learning will be all the more efficient the more organized the previous concepts are. Not only does the individual need to be willing to learn, but also the content to be incorporated needs to have logical and psychological meaning. Thereby, unlike simple memorization, the student-subject (and therefore agent, with his active role) deepens in the understanding and knowledge of information, integrating the data, according to the experiential context. Thus, there is the establishment of meanings and its subsequent rescue, when requested, becomes easier and more natural, such as an "anchor" that is pulled, at specific moments. It should be noted that, at certain times, the mechanical process of memorization needs to occur (as in cases of surgical procedures, e.g.); however, they are specific1. Taking this into account, it is assumed that the student already knows previously, to some extent, certain subjects, however it is necessary to know what this starting point is. Therefore, it is essential to identify what are these concepts, ideas, representations that students bring with them, since they could be better accessed by the new ideas8. Hence, scientifically well-based play and playthings will present positive and significant results in learning.

In this sense, the previous ludic advance organizers are of paramount importance, since they help in this relationship, playing the role of mediator (Moreira, 2013; Pontes, Rego, & Silva Junior, 2006; Ribeiro, Silva, & Koscianski, 2012). According to Ribeiro, Silva and Koscianski, some previous conceptions may not be important enough to connect with the new content. Therefore, these organizers, by highlighting the most evident points and omitting the less relevant ones, prepare a cognitive environment more conducive to this integralization; thereby, significant information on a given subject is presented to the student. It can also be highlighted that, when it is said significant, Ribeiro, Silva and Koscianski emphasize that it is understood as the establishment of a non-arbitrary anchorage, neither literal, but that results in selective data processing. In addition, such organizers may be classified as to their form of application, being divided into pre-organizers and post-organizers, which are presented before or after the main material; exhibitors when the subject is relatively new; comparisons if the

subject is more familiar; and pseudo-organizers, which are made with the intention of making it easier to understand broad and heterogeneous topics (Ribeiro, Silva, & Koscianski, 2012). Considering these classification aspects, it is possible to frame several elements of the active methodology such as videos, texts, images (Moreira, 2013), dynamics (Dias-Lima et al., 2019; Gotardelo et al., 2017), in the bulge of the previous organizers, provided that the conditions mentioned above are respected.

2.3. Acrostics and Crosswords as Advance Organizers of Medical Education

The study group of the authors of this proposal has already published some reports of experiences with ludic teaching activities, in the form of a quiz and other educational games in medical academic course (Souza et al., 2020a); and, also, as a theater play about suicide (Souza et al., 2020b). In this study, the group proposes, as advance organizers in medical education, acrostics and crosswords. Initially, it is important to define these proposals starting with the acrostic; this is seen as a type of textual genre in which the first letters of each verse compose, vertically, names or concepts (Bunn, 2020). In **Figure 1** and **Figure 2**, as a proposal of advance organizers, it is observed examples of acrostics, with the themes "Medical Education" and "Acrostic". In relation to crosswords, they can be defined as structures with empty spaces that demand their filling, according to the conditions imposed both by the limit of available squares as by the required questions (Benedetti et al., 2009). **Figure 3** presents, as a proposal of advance organizer, the crosswords with the theme "Medicine".

When faced with such types of cognitive mediators, the brain processes information generating thoughts. When considering this perspective, it is worth mentioning that the thinking act is, generally, the result of an association of psychosomatics elements with the reality external to the individual (Gomes et al., 2007; Ribeiro, Silva, & Koscianski, 2012). Such cognitive products may or may not be effective in knowledge production, depending on the presence of anchors (Agra et al., 2019; Moreira, 2013; Ribeiro, Silva, & Koscianski, 2012).

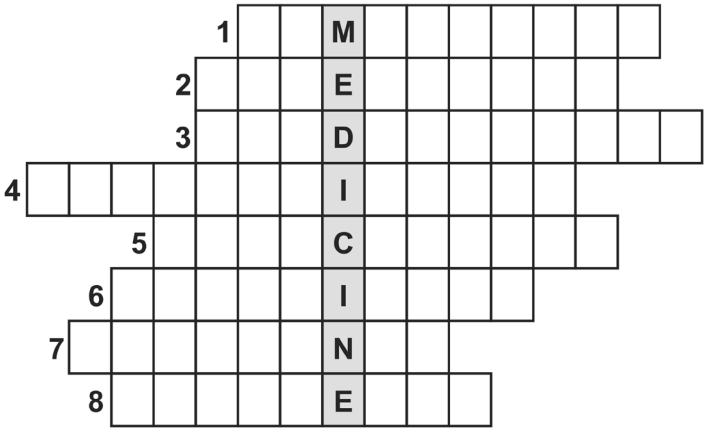
Acrostic is a language composition that has some meaning...
Communicates knowledge, information, scientific facts, and poetry…
Realistic or fictitious, but with learning content and...
Optimize a new method of concept memorization, with...
Seriousness, clarity, objectivity and significance, to help...
Teachers and students in the learning and teaching course…
I nteractive, creative and ludic lessons have the essential...
Cognitive and humanitarian medical education commitment.

Figure 1. First example of an acrostic that can be used in medical teaching.

Medicine has a long and challenging academic course…
Educators need to seize the opportunities for teaching...
Depending on culture and socioeconomic resources…
I dentity of their students, family and their new friends…
Concepts of thinking, arguments and judgments needed
Appropriate level of knowledge and developing skills…
Like significant learning and experiences.

Effective learning tools like Problem-Based Learning…
Dedicate their knowledge instruments to the students…
Unite advance organizers, subsumers and news topics…
Cognitive structure of the students helps in intentional…
Active, personal, dynamic, recursive (non-linear) and…
Totally interactive teaching and learning processes…
I n the light of Ausubel, Piaget and Vygotsky's ideas…
Optimizes acrostics and crosswords-like methods…
Not conventional but effective for playful learning.

Figure 2. Second example of an acrostic that can be used in medical teaching.



Questions

1. Method of producing a three-dimensional image of the internal structures of a solid object by the observation and recording of the differences in the effects on the passage of waves of energy impinging on those structures.

2. The functional tissue of an organ as distinguished from the connective and supporting tissue.

3. Study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems.

4. Study of physiological cycles and rhythms that occur in living organisms, including humans.

5. Study of conditions that are caused by an invasion of the human body by pathogens.

6. Branch of medicine focused on the diagnosis, treatment and prevention of mental, emotional and behavioral disorders.

7. Cells derived from the undifferentiated inner mass cells of a human embryo.

8. Information gained by a physician by asking specific questions, either of the patient or of other people who know the person and can give suitable information.

1. TOMOGRAPHY / 2. PARENCHYMA / 3. EPIDEMIOLOGY / 4. CHRONOBIOLOGY
5. INFECTOLOGY / 6. PSYCHIATRY / 7. EMBRYONIC / 8. ANAMNESIS

Figure 3. Example of a crossword that can be used in medical teaching.

Some studies have shown that the absence of such anchors, *i.e.*, the lack of previous conceptions in cognitive system (Agra et al., 2019; Moreira, 2013), or even its meaningless presence (Ribeiro, Silva, & Koscianski, 2012), are situations that become an obstacle to the learning process. Hence, the advance organizers like the acrostics and the crosswords that have been referred previously, are fundamental. As they are previously presented, introducing a theme, with the highlighting of the main points and omission of the not so relevant, a more effective anchorage is provided; considering that a greater significance will be given to the interrelated components (Ribeiro, Silva, & Koscianski, 2012).

Therewith, the acquisition of knowledge does not occur randomly (Agra et al., 2019; Moreira, 2013; Ribeiro, Silva, & Koscianski, 2012). Contrariwise, there will be logical, both mental and psychological, relationships (Agra et al., 2019; Dias-Lima et al., 2019), since, actively, the student-subject (no longer patient as he was in the old teaching methodologies) integrates the instruments and cognitive elements that are at his disposal. Afterwards, reflecting on his knowing how to think and how to do, he can know how to think and how to act in the face of the problem confronted. It is emphasized that this ludic obstacle, according to some studies, are perceived in a positive and motivating manner by the students, a fact that contributes to a greater engagement and concentration in the task undertaken (Dias-Lima et al., 2019; Gotardelo et al., 2017). Finally, it is important to say that this non-negative environment was provided due to teaching-learning; this defends the idea that the relationship between student and teacher, as well as student and its pedagogical process. It needs to take place in a new way, focusing attention on the student, who becomes responsible for his intellectual trajectory (Dias-Lima et al., 2019).

3. Conclusion

The elaboration of advance organizers for a higher significance in medical education is primordial, both for teachers as for students; considering that the process of thought begins with the concept of vocabulary, followed by their union in a logical and coherent reasoning and, finally, with the ability to judge reality. In this way, as noted, the acrostics and crosswords facilitate this process, with the acquisition of full and ludic knowledge, implying both in the most favorable pedagogical practice and the better medical formation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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