



THE CONSTRUCTIONIST PARADIGM AND THE ACTIVE METHODOLOGIES IN HEALTH EDUCATION

O PARADIGMA CONSTRUCIONISTA E AS METODOLOGIAS ATIVAS NA EDUCAÇÃO EM SAÚDE

EL PARADIGMA CONSTRUCCIONISTA Y LAS METODOLOGÍAS ACTIVAS EN LA EDUCACIÓN EN SALUD

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RESUMO

Este ensaio discute os fundamentos teóricos que embasam a andragogia e algumas metodologias ativas utilizadas na educação em saúde, defendendo que seus princípios fundamentais se assentam no paradigma Construcionista de aprendizagem em contraposição aos paradigmas Instrucionista e Tecnicista. Neste sentido, apresenta as ideias de Jean Piaget, Papert, Ausubel, Vygotsky, Carl Rogers, Wallon, Malcolm Knowles e Dewey, ressaltando o alinhamento de suas ideias no que diz respeito à concepção de aprendizagem, aos papéis dos docentes e dos discentes no processo de ensino-aprendizagem, à visão do erro e à questão da avaliação. Por fim, demonstra de que maneira o Construcionismo contribui para a andragogia e para as diferentes metodologias ativas utilizadas na educação em saúde, notadamente a Problematização, a Aprendizagem Baseada em Problemas e a Espiral Construtivista.

Palavras-chave: Educação Superior; Educação em Saúde; Aprendizagem; Aprendizagem Ativa.

ABSTRACT

This essay discusses the theoretical foundations behind andragogy and some active methodologies used in health education, arguing that its fundamental principles are based on the Constructionist paradigm of learning as opposed to the Instructionalist and Technician paradigms. In this sense, it presents the ideas of Jean Piaget, Papert, Ausubel, Vygotsky, Carl Rogers, Wallon, Malcolm Knowles, and Dewey, highlighting the alignment of their ideas regarding the concept of learning, the roles of teachers and students in the teaching-learning process, the view of error, and the issue of assessment. Finally, it demonstrates how Constructionism contributes to andragogy and to the different active methodologies used in health education, notably Problematization, Problem-Based Learning, and Spiral Constructivism.

Keywords: Higher Education; Health Education; Learning; Active Learning.

RESUMEN

Este ensayo discute los fundamentos teóricos que subyacen a la andragogía y algunas metodologías activas utilizadas en la educación en salud, argumentando que sus principios fundamentales se basan en el paradigma de aprendizaje construcionista, en contraposición a los paradigmas instruccional y técnico. De esta manera, presenta las ideas de Jean Piaget, Papert, Ausubel, Vygotsky, Carl Rogers, Wallon, Malcolm Knowles e Dewey, enfatizando la alineación de sus ideas con respecto a la concepción de aprendizaje, a los roles de los docentes y de los estudiantes en el proceso de enseñanza-aprendizaje y a la visión del error y al tema de la evaluación. Finalmente, demuestra cómo el Construcionismo contribuye a la andragogía y a las distintas metodologías activas

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utilizadas en la educación en salud, entre las que destacan la Problematicación, el Aprendizaje Basado en Problemas y la Espiral Constructivista.

Palabras clave: Enseñanza Superior; Educación en Salud; Aprendizaje; Aprendizaje Activo.

INTRODUCTION

The training of health professionals in Brazil, from the 8th National Health Conference of 1986, held in Brasilia, under the coordination of the Ministry of Health, took on new contours when this event proposed a single and decentralized health system, which is embodied in the 1988 Constitution, with the creation of the UHS.

At the same time, the skills and competencies foreseen in the National Curriculum Guidelines (NCGs), which advocate the formation of a critical, creative professional with expanded analysis and decision-making capacity, and those presented by the Law of Directives and Bases of National Education (LDBEN),¹ comprising the **Learn to Know, Learn to Do, Learn to Live Together** and the **Learn to be** (our emphasis), invite the educational institutions to change their pedagogical practices, adopting practices that are based on the need to train this new professional profile.

In this new context, the educational proposals begin to make use of the so-called active methodologies that² "[...] are grounded in a significant theoretical principle: autonomy." A process that presupposes, therefore, self-initiative and cooperative processes both moral and intellectual.

In the search to understand these formative proposals, and the so-called active methodologies adopted by them, the researcher was motivated to study and understand the theoretical bases of psychology of learning that support them, which resulted, among other things, in this essay. This study seeks to offer health area teachers subsidies so that teaching practice is not reduced to the mechanical application of teaching techniques, but is a practice based on and articulated.

One can observe three conceptions of learning arising from the different perspectives considered by psychology and which, taking into account their variations, are present in academic environments, being identified from their conceptions about knowledge, learning, teaching, error, the roles of the student and the teacher and, consequently, about assessment. They are: Instructionism, Technicism, and Constructionism.³

Here we will describe the third paradigm, the **Constructionist** proposal,⁴ the object of this essay, as this paradigm is the one that provides the theoretical

support for active methodologies, as will be demonstrated in the course of the essay.

THE CONSTRUCTIONIST PARADIGM THEORISTS

To explain the Constructionist paradigm, we start from the Constructivist theory, conceived by Piaget, who posited that no knowledge is pre-existent in the subject or the object, but constructed - or reconstructed, more precisely - internally by the subject, in his active interactions with the world. According to him:

[...] the object only exists, for knowledge, in its relations with the subject, and if the spirit always and increasingly advances to the conquest of things, it is because it organizes experience in an increasingly active way, instead of imitating from the outside a completely made reality: the object is not a given, but the result of a construction.^{5:351}

Knowledge about objects would be constructed, therefore, from the subject's actions on those objects.

When considering that Piaget brought the understanding of how knowledge is constructed in the human head, Papert⁶ proposed a model of intervention in this process, the Constructionism, whose methodology is embodied through the construction of objects by the subject learner and "speaks to us of the need, in learning environments, to make available to the subject tools to help learning, objects to 'think with'".⁴

For him, developing mastery of knowledge is similar to what happens when you join a new community of people, stating that:

[...] when we enter a new field of knowledge, we initially encounter a multitude of new ideas. Good learners are able to select those that are powerful and appropriate. Less skilled ones need help from teachers and friends. But we must not forget that while good teachers play the role of ordinary friends who can make introductions, the task of coming to know an idea or person cannot be performed by a third party. Each one must acquire the skill in "coming to know" and a personal style for doing it.^{7:167-8}

That is, Papert argued, following Piaget, that knowledge is a process of active construction of the learning subject, developed from its interaction with the object of knowledge. And, for this, he used already established internal resources - which he called powerful ideas and Ausubel called subsuncores - and comprehension strategies for the new ideas that emerge based on the already sedimented

strategies. Sometimes these new ideas contradict previous ones, and the learner develops new strategies to deal with this conflict. These conflicting ideas, sometimes "can be reconciled, sometimes one or the other part must be abandoned, and sometimes 'both can be preserved' if kept in separate compartments".^{7:149}

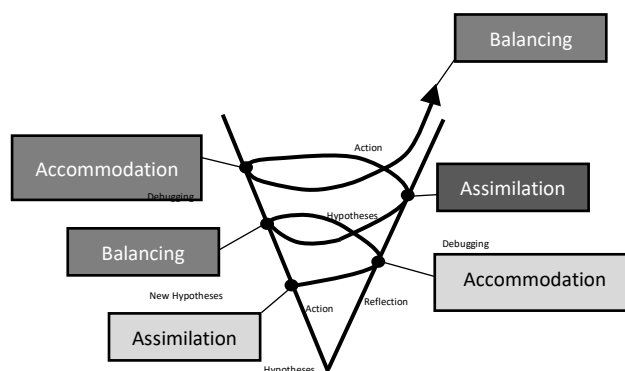
This constructionist perspective expanded the possibilities of understanding and intervention in the learning process and imposed the need to add to Piaget's contributions those of other researchers, such as Ausubel, Vygotsky, Carl Rogers, Wallon, Malcolm Knowles, and Dewey.

According to the Constructionist paradigm, learning is to construct relations internally from interactions with the world, mediated by culture.

Regarding this conception, when faced with any situation, which is configured as something to be solved, the learner raises hypotheses on how to understand or solve that situation, submitting these hypotheses to tests (through physical or operative/cognitive actions), reworking them from the results it observes, subjecting them to a new test, until the result satisfies him, in a recursive process.^{8:11} This cycle, according to the author, is also interwoven with socio-historical aspects, which organize the way the learner perceives the world and organizes the possible alternative solutions, built on his experiences in the "macro and micro relationships with other human beings and with social institutions".^{3:46}

However, in each cycle, the learner does not resume the equilibrium at the same level as before, but at a level above that, which he called "majorant rebalancing", that is, "the rebalancing with improvement obtained".⁹ This point of view is best represented by the figure of the spiral, as explained in figure 1 below:

Figure I – Learning spiral



Thus, the construction of knowledge involves, without a doubt, a process of creation, of innovative adaptation, of adoption of strategies and conceptions

unheard of, at least, for the learning subject. In a word, the possible cognitive is essentially invention and creation, hence the importance of its study by a constructivist epistemology [...].^{10:8}

In this case, it is understood that teaching implies acting as a catalyst of this cycle by creating an environment rich in challenges, imbalances and questioning that aim to provoke new hypotheses in the learner, helping him to systematize the results.

This same direction, brought the concept of Zone of Proximal Development (ZPD), which he defined as the space surrounding those functions of the subject that "[...] have not yet matured but are in the process of maturing, functions that will mature but are presently in an embryonic state".^{11:113} By traveling through this zone, the individual expands his zone of real development, characterized by what he is able to do alone.

It is obvious that for the facilitator's work to be effective; it must take place within the ZPD. Accompanying him through it is the effective possibility of catalyzing the processes of development and learning, considering that there are tangible challenges that can mobilize the subject so that he gets actively involved, in addition to considering the social context in which the learner is inserted.

A similar concept is presented by Ausubel, when explaining his ideas about meaningful learning, when he states that:

An obvious way to classify learning variables is to divide them into intra-personal (factors internal to the learner) and situational (factors in the learning situation) categories. The intrapersonal category includes (a) cognitive structure variables - substantive and organizational properties of previously acquired knowledge in a particular subject field that are relevant to the assimilation of another learning task in the same field. (b) developmental readiness - the particular type of readiness that reflects the stage of learning of intellectual development and the capacities and mode of intellectual functioning characteristic of the stage.^{12:26-7} (our translation).

As can be seen in the text above, there the author introduced a concept that comes to be called subsumption, which is a particular and specific, prior cognitive structure to which new knowledge is attached, by stating that one of the elements of the intrapersonal category, cognitive structure variables, refer to the "substantive and organizational properties of previously acquired knowledge in a specific subject field that are relevant to the assimilation of another learning task in the same field".

"The subsumption can also be a concept, a construct, a proposition, a representation, a model, in short, a prior knowledge specifically relevant for the meaningful learning of certain new knowledge".^{13:4}

Cognitive experience is not restricted to the direct influence of concepts already learned on components of the new learning, but also encompasses significant modifications in relevant attributes of the cognitive structure by the influence of the new material. There is thus a process of interaction whereby more relevant and inclusive concepts interact with the new material, acting as anchors, that is, encompassing and integrating the material and at the same time changing themselves as a function of this anchoring.^{14:4}

In other words, what happens in the process of knowing is not a mere incorporation of the external world, which adds to what the learner already has, but an interactive process, in which the learner's structures are modified while integrating the new material, which is not installed in a definitive way, but is organized in a provisional way until new elements destabilize it and a new anchoring process proceeds to new re-elaborations of the subsumers.

In a constructionist environment, therefore, it is necessary that the student acts on the situations and challenges that cause disequilibrium; but not only that, because it is his epistemic path to raise hypotheses and test them, reflecting on the results that his action, guided by the constructed hypotheses, provokes. Here the Piagetian concept of the active student is present,^{10:140} be it an adult or child, whose action is not only physical, behavioral, but also operative, in the search for the restoration of balance, in a true complementary "dance" between needs and possibilities.

Piaget explained that in order to understand the genesis of the possible, it is necessary:

To point out the role of the limitations from which the subject must free itself. These are linked to an initial indifferentiation between the real, the possible and the necessary, every object or matter of the presentational scheme appearing initially to the subject, not only as being what they are, but also as necessarily having to be, which excludes the possibility of variations and changes.^{10:9}

In other words, to make possible the new comprehensions of reality, free from the impossibilities or necessities imposed by the cognitive structures that the learner maintained until then, it is imperative that the error happens, because

"[...] from the point of view of the possible, a corrected error can be more fruitful for ulterior openings than an immediate success".¹⁰

In the same perspective, advocates of meaningful learning said that:

When discrimination between new learning material and ideas established in the cognitive structure is inadequate because of instability or ambiguity of prior knowledge, comparative organizers that explicitly delineate similarities and differences between the two sets of ideas can significantly enhance discrimination and therefore facilitate learning and retention.^{12:143-4} (our translation)

In this way, Constructionism, which presents the error as an unexpected result, explains that it is the error that provokes a movement of reflection, which takes place on two levels: a reflection on the results of his action and a reflection on the thoughts that organized the action that led to that result. Although the error does not guarantee learning, in the final analysis, it is the debugging of the error that "[...] provides the student with the chance to reformulate his ideas, his mental schemes, and apply them to the same problem at hand, in order to verify the effectiveness of these new ideas".^{8:22}

In other words, reflection on the error enables the subject to become aware, not only of the concepts and contents, but also of his own strategies and internal processes and, [...] "the becoming aware of a scheme of action transforms it into a concept, this becoming aware therefore consisting essentially of a conceptualization".^{10:197}

When considering this perspective of knowledge and how one learns, assessment, instead of measuring or approving/rejecting the student, has the function of following up the learner's hypotheses, identifying at what cognitive level he or she is, learning what concepts he or she has mastered and what strategies he or she uses to understand the situation and seek solutions to problems, with the aim of directing the next step in the teaching-learning process. In this sense, it is procedural and not terminative.

"Finally, because the construction of knowledge is a combinational process, and not a summative one, assessment does not lend itself to quantifying it, since, in order to measure something, a scale is required, which presupposes a summative structure".^{3:49}

A teaching practice that favors this perspective starts, therefore, from the problematizations arising from the interactions of the learner with the world, either spontaneously, or by provocation of the educational or psychosocial and cultural environment where he/she is inserted.

Carl Rogers proposed a type of learning that he defined as "meaningful, sense-filled, and experiential. Such learning "[...] has a quality of personal involvement - with the whole person, in his sensory and cognitive aspects, finding himself within the act of learning".^{15:165}

According to him, for this learning to take place, the teacher needs to function as a catalyst, and should "set the stage for a mental scenario of inquiry by presenting the problems, creating an environment that reacts well to them, and granting assistance to students in the operations of inquiry".^{15:165} it should also confront them with topics that are meaningful and relevant to them, creating circumstances that engage them with a problem that becomes very real.

He also pointed out that "[...] this environment makes it possible for students to make autonomous discoveries and engage in self-directed learning",^{15:156} objective present in any educational process.

In this direction, he advocated that the time currently spent on pre-defined explanations, lectures formatted a priori by the standardized curriculum and prescribed exams be replaced by a learning environment where students can choose the elements that best meet their needs, with the teacher having the role of provoking, supporting, guiding and catalyzing the construction of knowledge, making available the resources demanded by the learners.^{15:157}

CONSTRUCTIONISM, ACTIVE METHODOLOGIES AND ANDRAGOGY

The active methodology can be defined as "a teaching strategy centered on the student, who leaves the role of passive receiver and assumes the role of agent and main responsible for his learning" and aims at the construction of knowledge, by the subject, based on his experiences and professional practices, whether real or simulated.^{16:21}

Numerous active methodology strategies have been used in Higher Education, including in the health area; however, it is important to highlight some characteristics that distinguish a methodology as active, in Cecy's perspective, namely: to be constructivist, collaborative, interdisciplinary, contextualized, investigative, motivating, challenging, should favor a reflective attitude and stimulate a critical stance and have a humanistic character.^{16:25-7}

Over the years, the study of active methodologies has intensified with the emergence of new strategies that can promote learner autonomy, from the simplest to those that require a physical and/or technological readjustment of educational institutions, which, in a way, has also been inducing structural,

curricular and teacher training changes in higher education courses in the health area.¹⁷

However, regardless of the changes of great complexity or high investments, professors from several institutions have already been employing "problematizing methodologies, to take the student to the practical context, confronting him/her with real or simulated problems. This enables the student to use the knowledge acquired in a holistic way, minimizing the occurrence of a fragmented education".¹⁷

Such methodologies become especially relevant when it comes to adult education, through the term "Andragogy", which he defined as a process of targeted search.^{18:4}

His work highlights that adults must guide their learning process by a need, usually related to their work context and personal interest. Adults have a need for self-direction that involves deciding what they want to learn. ...] Thus, if we structure the learning experiences we are offering in a way that facilitates connections between what is already known and the present needs of the individual, we can make the actual learning more meaningful (the essence of meaningful learning).^{18:4}

In fact, even before taught that "the most valuable resource in adult education is the experience of the learner" (our translation), indicating that this should be the starting point for the learning process.^{19:9} In other words, learning, to be effective, must have as its reference the significant experience of the learner. He went even further and stated that:

Small groups of aspiring adults who want to keep their minds fresh and vigorous; who begin to learn by confronting pertinent situations; who search the reservoirs of their experience before turning to secondary texts and facts; who are led in discussion by teachers who also seek knowledge, not oracles: this constitutes the setting for adult education, the modern search for the meaning of life.^{19:11} (our translation).

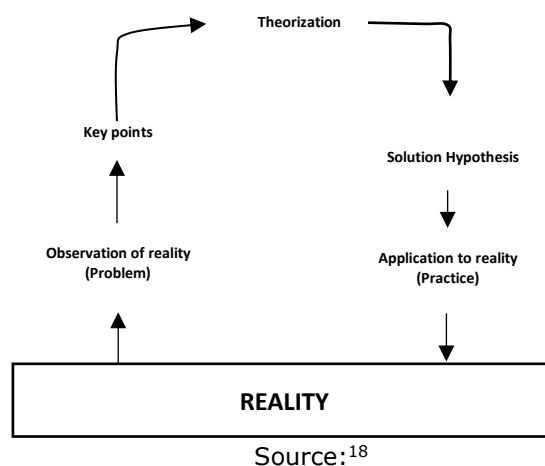
According to a study,²⁰ it is argued that "the initial stage of this developing experience that is called thinking is experience" (our translation), which implies the "need for a real empirical situation as the initial stage of thinking"^{20:125} (our translation).

Among the known active methodologies, which take as reference, for the learning process, the experience of the learning subject, three are briefly described: Problematization, Problem Based Learning (PBL), and Spiral Constructivism.

When addressing the first two, it is said that although they are quite similar, they are distinct strategies and, according to them, "are instruments that are being recognized as activators of teaching and health service integration," in which problematization is deliberately used as a teaching-learning strategy, in which the focus is on learning how to learn.^{21:352}

The problematization occurs by putting the learner in contact with a real situation, which he should observe carefully, identifying its characteristics and raising his perceptions about it, starting, in a second moment, to raise central aspects for study, selecting what is fundamental to understanding the problem. In the third moment, the student must search for the theories that can explain the observed situation under the guidance of the teacher. From this theorization, in the next moment, hypotheses must be elaborated to solve the problem and, finally, an intervention in reality. These phases are represented by the Maguerez Arc, as shown in the following figure.

Figure 2. Maguerez Arch



Source:¹⁸

Differently, in PBL, the problems to be analyzed are constructed by teachers and presented to students as starting points for the process. Such problem situations are close to situations experienced by them in practice and seek to integrate the various disciplines and contents that need to be worked on at that moment in the course.

It is based on the study of problems, proposed with the purpose of making the student study certain content. Although it is not the only pedagogical practice, it predominates for learning cognitive content and integrating subjects. This methodology is formative, as it stimulates an active attitude from the student in search of knowledge, and not merely informative as is the case with traditional pedagogical practice.^{22:145}

Important references about PBL were found on the website of the State University of Londrina (1997) where one can see, among other things, that in this methodology:

[...] a list of situations that the student should know/be able to master is prepared. This list is analyzed situation by situation in order to determine what knowledge the student should possess for each situation. This list constitutes the study themes. [...] each theme will be transformed into a problem to be discussed in a tutorial group, when it is a theme that concerns the cognitive sphere.^{22:145}

The apprentices are then organized into tutorial groups of ten or twelve participants and subjected to a process that is laid out in seven steps:²³ **1** – Identify and clarify the unfamiliar terms presented in the scenario; make a list of those that remain unexplained after discussion; **2** – Define the problem or problems to be discussed. At this stage, the students may have different points of view on the issues, but all should be considered. Records should be made of the list of agreed-upon problems; **3** – Hold a brainstorming session to discuss the problem(s), suggesting possible explanations based on prior knowledge. Students should draw on each other's knowledge and identify areas of incomplete knowledge. Again, it is necessary to record the entire discussion; **4** – Review steps two and three and make the explanations available as attempted solutions. Record and organize the explanations and restructure them if necessary; **5** – Formulate the learning objectives. The group reaches consensus on the learning objectives. The tutor ensures that the learning objectives are focused, achievable, comprehensive and case-appropriate; **6** – Individual study (all learners should gather information related to each learning objective) and **7** – The group builds on the results of the private study (students point out their learning resources and share their results) for a collective discussion. The tutor checks the learning and can evaluate the group.

The Constructivist Spiral,^{21:353} has been used in Brazil since 2004, in undergraduate and graduate health courses, being considered a problematizing

methodology. It takes place through six steps: "the identification of problems, formulation of explanations and elaboration of learning questions were called 'provisional synthesis'.^{24:427-9} The search for new information, the construction of new meanings and the evaluation constituted a 'new synthesis'".

This methodology is also done in small groups of eight to ten students, accompanied by a facilitator, and only the search for new information is done individually. It is clarified that:

In the "provisional synthesis", processing begins in the learners' interaction with the learning trigger. The triggers can be: (i) problem situations elaborated by teachers, (ii) practice narratives elaborated by learners, (iii) systematized products from learners' performance in real or simulated scenarios. This diversity allows us to work the teaching-learning process from different perspectives, besides employing a spectrum that contemplates: (i) more structured and controlled situations, such as problem situations; (ii) semi-structured situations, such as simulations; and (iii) poorly controlled situations, such as narratives or products elaborated from the performance in real scenarios.^{24:428}

As can be seen, this methodology is structured from the perspective of the constructionist learning spiral presented in figure 2 of this essay.

That said, it is understood that the ideas presented here can be of great value in the structuring of training proposals for teachers working in the training of health professions, as well as in the construction of methodologies and pedagogical tools that can help them in this task of facilitation, particularly in the development of activities that use active methodologies.

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