INGENIOUS EXPERIENCES IN HEALTHCARE EDUCATION: A DEBATE ON COGNITIVE POLICIES

EXPERIÊNCIAS INVENTIVAS NA FORMAÇÃO EM SAÚDE: UM DEBATE SOBRE POLÍTICAS COGNITIVAS

EXPERIENCIAS INVENTIVAS EN FORMACIÓN EN SALUD: UN DEBATE SOBRE POLÍTICAS COGNITIVA

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ABSTRACT

Cognitive policies generate agencing environments which engender methods of teaching and of producing knowledge. This article aims at describing teaching experiences carried out by faculty members working in healthcare, mediated by different technologies, which made it possible to experiment inventive learning, thus establishing cognitive policies that lead the teachers to new ways of teaching and interacting with their peers, students or with technology, and contribute to the transformation of cognitive systems. This is a case study supported by the cartographic method. It is understood that when teachers produce non-linear and problematizing pedagogical practices, they bring about contradictions with what has been previously established, allowing the emergence of conflicts, articulations and new associations between students and teachers, and much more powerful technologies for the training of healthcare professionals with a humane, critical, inventive and collaborative profile.

KEYWORDS: Healthcare training. Cognitive policies. Technologies

RESUMO

A política cognitiva gera espaços de agenciamentos que engendram modos de ensinar e de produzir conhecimento. Este artigo objetiva descrever experiências de ensino produzidas por docentes da área da saúde, mediadas por distintas tecnologias, que possibilitaram a experimentação de uma aprendizagem inventiva, conformando uma política cognitiva que direciona o professor para diferentes modos de ensinar e de se relacionar, seja com seus pares, com os estudantes ou com a tecnologia, contribuindo para a transformação dos regimes cognitivos. Este é um estudo de caso apoiado no método cartográfico. Percebe-se que, quando os professores produzem práticas pedagógicas não lineares e problematizadoras, estabelecem contradições com o instituído, possibilitando o estabelecimento de controvérsias, de articulações e novas associações entre alunos, professores e tecnologias muito mais potentes para a formação de profissionais da saúde com perfil humanista, crítico, inventivo e colaborativo.

PALAVRAS-CHAVE: Formação em saúde. Políticas cognitivas. Tecnologias.

RESUMÉN

Las políticas cognitivas generan entornos de cambio que engendran métodos de enseñanza y producción de conocimiento. Este artículo tiene como objetivo describir las experiencias docentes realizadas por docentes que trabajan en salud, mediadas por diferentes tecnologías, que permitieron experimentar el aprendizaje inventivo, estableciendo así políticas cognitivas que lleven al docente a nuevas formas de enseñar e interactuar con sus

pares, estudiantes o tecnología y contribuir a la transformación de los sistemas cognitivos. Este es un estudio de caso apoyado por método cartográfico. Se entiende que cuando los docentes producen prácticas pedagógicas no lineales y controvertidas, se establecen contradicciones con lo establecido anteriormente, permitiendo el surgimiento de conflictos, articulaciones y nuevas asociaciones entre estudiantes, docentes y tecnologías mucho más potentes para la formación de los profesionales de la salud. con un perfil humano, crítico, inventivo y colaborativo.

INTRODUCTION

In recent years, the education of healthcare professionals has been widely discussed, as it has a direct influence on the resolution of the health problems experienced by the population in Brazil. The professional who is trained according to the current curricular guidelines must have a humane, critical, thoughtful, and collaborative profile to work at all levels of health care (ROMAN et al, 2017). And to achieve this profile, the methodology used in the training process must transcend the traditional pedagogical practice associated with memorization and repetition, very much centered on the teacher's talk-dictate for the explanation of contents. Hence, healthcare education indicates a certain way of understanding and operating cognition, performing a given cognitive policy.

Kastrup (1999) brings up the concept of cognitive policies, suggesting that we should shift the focus of research, which is based on the functioning and structure of cognition, and move it to the practices that constitute cognition and shape it. The cognitive policy, therefore, is a specific way of understanding the world combined with a way of being in the world (GAVILLON, BAUM, MARASCHIN, 2017).

In the approach to understanding the production of knowledge where the cognitive task is merely focused on solving previously proposed problems – processing information derived from the environment (*inputs*) to produce adequate responses (*outputs*) – the cognitive policy that is established is that of representation (or recognition). Thus, in the recognitive policy, knowledge is conceived as being prior to human existence and when it is organized into a scholarly knowledge, determines the objects to be discovered in the classroom, and learning consists in conforming more perfectly to such objects. Students are encouraged to adopt (im)posed models and ways of solving problems. Cognition is assumed to be a process of adaptation to the world through its representation (FUCK, 2016).

The recognitive policy relies on the view that there is a subject of prior knowledge and an object that has a reality outside of this subject, and, therefore, they are independent. This traditional way of understanding the construction of knowledge has been quite naturalized in healthcare training programs and majors, because recognition is part of existence.

Recognition experiences are those that provide the identification or recognition of a certain object/thing in order to achieve a good performance in certain circumstances, solving problems, because "it is characterized by repetition, by a type of functioning that always remains the same, protected from the effects of transformation" (KASTRUP, 1999, P. 67). Such recognition experiences are automatic and useful in everyday life, as they guarantee the individual's (subject's) adaptation to the world, because when we see an object and name it, its idea is already in our memory, and for this reason, we only need to repeat it. For example, stopping the car when you see a red light to avoid causing an accident, or performing the practical procedures described in the algorithm for cardiopulmonary resuscitation when facing a cardiac arrest, are actions that result from recognitive experiences.

Another possible way of relating to cognition is from the concept of the policy of invention, which focuses on learning how to learn, inventing oneself and the world in an autonomous construction. According to Kastrup (2005, p. 1275), "the subject, as well as the object, are effects, results of the process of invention, it is the action, the doing, the cognitive practice that defines the subject and the object, the self and the world". As a result, the notion of subject and object as opposing poles in the process of knowledge production is discarded, because subject and object are effects of cognitive action, they are co-engendered and produce each other reciprocally. In this way of understanding the production of knowledge, invention is not understood as an ability to solve problems, but rather the ability to produce problems, not being limited to a mere insight, but instead to the laborious process of searching, of exploration, experimentation, and formulation (KASTRUP, 1999). This process demands time, and the result is always unexpected, because one does not know what may happen.

From the perspective of an inventive or ingenious learning, the role of the environment is to disturb the organism, to affect it, to create 'breakdowns', to pose problems, and not just to convey information. Kastrup (1999) uses the word 'breakdown' to mean a disruption, a crack in the recognitive continuum, potentializing the birth of the novelties and the unleashing of its cognitive abilities from its congruous exercise. "This is why it is a type of problematization experience: it intrigues, makes people think, it forces inventiveness. It is an experience of restlessness, of cognitive instability" (KASTRUP, 1999, p.69).

Recognition is present in everyday life, however, it alone does not address all the experiences that arise in human life and in health care. We need to experience a type of learning that produces newness. And the inventive cognition – which is not produced in the realm of what is stabilized and planned, but instead in the unforeseen – seeks new approaches and new practices that make us go beyond what was already stabilized in our memory, that which our recognition provides us with.

In the inventive cognitive policy, knowledge cannot be understood only as a representation, in which facts/objects outside the subject are perceived, understood, and replicated, but rather as an action, a practice. This is why it is important to understand that inventive learning includes recognition, but goes beyond it, being aware of the possibilities of production in the learning itself and from it as well. It is about the process of learning to live in a world that does not provide a pre-established foundation, in a world that we invent as we live (KASTRUP, 1999; GAVILLON, 2014). When faced with a new situation, such as many situations experienced in the daily routine of health care, representation may not be able to handle the unexpected, then inventive cognition shows the way towards creation in the act, knowing how to problematize the situation and find new strategies, new paths, new ways of knowing, creating a self and a world. Thus, the notion of invention operates an expansion of the concept of cognition.

However, the challenge of experimenting and creating something new requires destabilizations, risks, movements, it requires learning of how to create problems and not just to solve them. In inventive cognition, the problem is perceived as an ally, as a power to set thought in continuous motion.

These statements regarding the different cognitive policies (representational and inventive) are not restricted to the mere difference between theoretical models, because each conception refers to a way of being in the world, of establishing a relationship with oneself and with the production of knowledge itself.

The intention is not to replace one theoretical model by another, but to encourage, invite, motivate people to practice another cognitive policy, a new and challenging way of knowing, living, and being in the world (KASTRUP, 2008), because the power lies in the acts of thinking, formulating, constructing, experimenting, and not only in copying and replicating. We cannot move away from recognition, because it helps us organize ourselves in the world, but we need to expand our potentialities related to cognition if we intend to perform a liberating, creative and ingenious healthcare education. It is necessary to propose educational experiences that aim at enabling the performance of an inventive individual/subject and not only a skilled one, an autonomous subject and not only a trained one, someone who is qualified for the intervention and not only for the repetition. For this to be achieved, the direction cannot be either towards a mere adaptation to a given environment or the assimilation of a certain knowledge; it is important that the training have an experimental nature, an invention of oneself and of the world.

In this context, it is essential to develop different ways of relating to technologies, so that we can produce different teaching practices, different realities, the solving of problems and, above all, the invention of problems. Technology (digital or analog), from the inventive policy standpoint, should not only extend or accentuate cognition, but rather interact with it,

penetrate it, generating new cognitive domains. Technologies cannot be merely means for learning and knowing, instead, they must be integral parts of the very ways of knowing and learning (MARASCHIN, AXT, 2005).

The performed cognitive policies - resulting from the associations between the different players (human and non-human) in the teaching and learning process - guide the way that technologies are integrated into pedagogical practices, potentially contributing to the transformation in the cognitive systems, in the ways of teaching, in the training of the healthcare professionals, and in new ways of caring. Fuck (2016) indicates that it is necessary to analyze how this integration takes place from the conformed agencing environments, as they are able to preserve or generate new modalities of knowing, as well as new ways of thinking, and new institutional ways of knowing.

In this regard, this article aims at describing teaching experiences carried out by faculty members working in the healthcare field, mediated by different technologies, which enabled the experimentation of an inventive type of learning in healthcare and the transformation of the cognitive systems.

METHODOLOGY

This is a case study, with a qualitative approach, supported by the cartographic method. This method enables one to navigate paths, follow the movements of the involved stakeholders, make choices as one progresses along the path. According to Barros and Kastrup (2009, p. 57), the purpose of cartography is "exactly to draw the network of forces to which the object or phenomenon in consideration is connected, providing information about its modulations and its permanent movement".

The research was developed in a public, multicampi university - an institution funded by the Government of the State of Bahia - between February and March 2018. Currently, the health department of this university offers six bachelor's degrees in health: Medicine, Physiotherapy, Pharmacy, Nursing, Nutrition and Speech Therapy.

This research used the one-on-one interview method with professors in the health department to map their experiences. A total of 17 professors were interviewed. The number of professors interviewed was not previously defined; the criterion for stopping the interviews was the saturation, when they did not add anything new to what had already been said. The professors who were exclusively involved in management activities were excluded.

Each person re-creates their explanations based on their day-to-day living, and the act of explaining emerges as a reformulation of the experience using previous experiences

(MATURANA, 2005), for this reason, listening to the professors in the format of interviews turned out to be an enriching way to understanding their actions, experiences, and feelings in the investigated context. The interviews, therefore, did not aim at collecting information regarding pre-existing worlds, but at researching the experience, which is understood as the realm in which the processes to be investigated actually take place (TEDESCO, CALIMAN, 2013).

All interviews were recorded and participants signed the written Informed Consent prior to the interview. Subsequently, the interviews were transcribed and a thorough reading was carried out in order to identify the description of what was lived and access processes and actions, for this reason we chose to perform the discourse analysis, understanding that what was essential in this methodological option was to capture not the content of what was said, but rather how the interviewees organized their actions from the relationships they established, the practices and the effects generated.

This study was submitted to the analysis of the Research Ethics Committee and was approved under legal opinion number 1.409.078.

THE INVENTIVE EXPERIENCES

The ongoing penetrability process of technologies in teaching is undeniable, but in the face of new artifacts, the dynamics of the university, the relationships and the way of understanding the knowledge production also need to be updated, given that there is a high probability of the established ways of teaching and learning to be maintained, which replicate the same patterns, but, now, with the help of modern technological equipment. Fuck (2016, p.31) points out that the "transformations in the cognitive systems and the invention of the novelties, are conditioned by the cognitive policy that guides the integration of these technologies in the pedagogical practices", therefore, it is not the mere insertion of technologies in the daily life of the university that will consequently change the educational process in health.

According to Pretto (2013), using technologies in an instrumental fashion is to simply apply them as teaching resources that are only useful to make the class more lively, motivate, or hold the student's attention. In this perspective, the training remains the same (supported by the teacher's talk-dictate) but combined with different technological elements, without bringing transformations. In order to achieve an inventive kind of learning, technology needs to be used as a building block, that is, as a structuring element packed with contents and as a catalyst for a new way of being, thinking, and acting. During the interviews, it was possible to identify some pedagogical strategies in which technologies were used in this perspective of being a building block, enabling the student to play the role of a builder of knowledge (of

him/herself and of the world), having technology and the professor as mediating elements of learning, as shown in the following excerpts.

> I had the students carry out a seminar, it consisted of presenting a pathology from an image of a famous painter, a sculptor, an image that would represent that disease, in their point of view. As an example, I brought a Portinari painting and associated it with anemia. A barefoot person, with a large belly suggesting that he/she was suffering from verminosis, a malnourished person. I went on explaining my linkage between the painting and the disease (...) At first they complained, but I insisted (...) For them to choose the image, first they had to understand the disease (...) The seminar was extremely beautiful. One group brought that image of the Creation, the linking of the fingers, and, from the image, they explained that hemophilia was passed on from father to son, and then women were protected. Then, they all made linkages and they will not forget the pathology. And in the following semesters they allowed me to use the images, and the linkages that they had made, in the other classes (PROFESSOR 'MS.' E).

> We worked on the production of photo shoots in a component called Health and Society. The photos had to be presented with a text. They were supposed to choose a content that we had discussed during the semester to be represented in the image of the photograph. It was very interesting. One of them was quite theatrical. One of the students set up a scenario where she was covered in blood, naked, with a sheet. The photos had these images. She addressed the issue of medicine and the control over the body, the issue of religion and the oppression, especially towards women (...) On another occasion, we organized something like a video contest, and it was a really cool experience too. But, for the photo shoot, we did make an exhibition. We managed to arrange a spot in the library for them to make an exhibition for one month, along with the texts (PROFESSOR 'MS.' T).

It can be noticed from these statements the creation of inventive environments that allowed the students to engage in a movement towards the creation of lines of escape, forging a crevice in the didactic-functional model that has already been established in face-to-face teaching, that is, the teacher's talk-dictate. The experience-based methodology using works of art or visual materials produced by the students themselves is characterized as a problematization experience, where the student was disquieted, forced to create, to tread new paths. The knowledge was not limited to a mere representation of what was said by the professors, instead, it was performed as an experimentation of the problem, creation and production of the reality, generating among the students a multiplicity of ways of thinking and knowing.

The creation of experiences where the student can interact with the teacher, with other students, and with technology in an inventive perspective indicates the possibility of technologies to be perceived not only as means to learn, but as inherent to the very ways of learning and knowing. Alves (2016, p.581) states that, in this perspective, the "differential emerges through the development of practices for the attribution of meanings, that value the autonomy and authorship of the learning subjects, moving closer to their desires and demands". In these experiences, the act of learning was not restricted to the idea of retaining

some knowledge taught by the professor, it actually transcended the definition of recognition, acquiring the meaning of taking action, of producing oneself and the world, while the learners established relationships, associations, exchanges, and agencing with peers, with technologies, with the female professors, with the book, with the internet, among others, in the pursuit to find meanings and connections. Cognition arises as an action that emerges from associations.

These experiences show that without such stiff scripts, less centered on the talk-dictate approach, one can foster exploration, creation, and cooperation in the class in a non-linear way. The idea of exploration, in itself, is an invitation to reflect upon the act of learning from a different perspective than the traditional one with regard to the knowledge transfer. The students learn from their explorations, from the paths they choose to follow, from the exchanges they make; they reframe what is discussed in the classroom and develop new meanings.

The experience of playing games was another pedagogical practice described in the interviews, as it was explained in professor 'Mr.' X's words.

> There was an activity that I did last semester in partnership with a colleague who is finishing a professional master's degree in management and technologies applied to education; we played a game here in the classroom. He developed the game and posed the challenge to me: to adapt that game for my course in the field of physiotherapy. The structure of the game was already prepared, but together we designed the challenges, the cells. The game was a walking board. The students would go walking through the cells, and in each cell there was a question, there were practical activities, challenges. The game is open, and it can be adapted to any context, to any major. The students loved it because I worked with concepts and contents that had already been discussed in the previous classes. And there was a lot of material that had to do with daily life, with the professional practice of the physical therapist. It lead the students to interact, work together as a team, develop leadership, autonomy, and proactivity, so it also promoted a lot of attitudinal skills. It was a recreational and fun activity that provided learning (PROFESSOR 'MR.' X).

One of the inseparable characteristics of the games is the fact that they are essentially social activities that have been present in the lives of human beings since the primitive times and have been studied as an element of human development, being present in culture as one of the manifestations of the symbolic sphere and of sociability (SCHLEMMER, LOPES, 2016). The act of playing games, within the formal educational process, can be performed in a moment of experimentation and problematization, because non-linear paths can enable a multitude of associations and agencing.

The dynamics described in this game used by professor 'Mr.' X is in line with the perspective of the inventive cognitive policy, where the established rules and challenges have taken on the function of disturbing the students, impacting them, and posing problems, and not only

conveying information. The students, that are understood as active and participative stakeholders, need – at every moment of the game – to discuss with their peers, choose strategies, and admit mistakes, so that they can create new paths until they reach the goals and objectives established in the game, within a multi-reference interaction network (ALVES, 2008). Therefore, this game environment makes the students sensitive to the construction of their own knowledge, with delightful opportunities for the development of their cognition. The intention was not only to make the pedagogical practice more lively, but to involve the students in an experience in which the movements, the exchanges, the interaction and the rules, have accomplished as an effect the invention of both a learning individual and knowledge.

If a game that is designed to mediate the process of education in healthcare only requires reaction from the student-player – instead of requiring exchanges and reflection – it is likely that the act of playing will not generate a change in the cognitive system. Thus, what is important is that, by acknowledging the possibility of an interpretative dimension of the act of playing a game, we can, in turn, acknowledge that games can be a means of communication through their recreational aspects, such as rules and objectives. And although the game is designed with limiting rules, it has countless possibilities for action, which only truly exist when invented by the players (GAVILLON, 2014). In this aspect, learning is performed in an immersive, exploratory, and inventive manner.

Besides the curricular content, professor 'Mr.' X highlights the development of other attitudinal skills derived from the act of playing. The dynamics of the game foster a collateral learning, emphasizing that what is important is the way the student-players are thinking while they are playing, and not what they are thinking (ALVES, 2008). Hence, this collateral learning is not related to curricular content, but rather to concepts that can be used in different situations in life, whether academic or not, such as logical reasoning, creativity, attention, problem-solving skills, and leadership.

The hybrid of classroom/game/students/teacher arises from continuous mediations during the act of playing, producing a network and an agencing environment, of relations of constitutiveness from which individual cognitive possibilities are defined and redefined, where modalities of knowing, ways of thinking, technologies, and institutional types of knowledge are generated (MARASCHIN, AXT, 2005). This agencing environment performed in the act of playing builds a cognitive policy and an implicated and inventive way of learning/living.

The game-based learning can take place through the act of playing, as previously explained, but also through the production of games, as described below:

> Working with interdisciplinarity, the students have to design a game that encompasses their courses in the semester. Our first game was the *Hipergame*, focused on the control of high blood pressure in elderly people. One of the requirements in the development of the game is that they must locate the target population within their context of reality, so that the game can promote healthcare education (...) We have board games, a smartphone application that addresses microcephaly, a dice game. The dynamics in the course entail the development of a project, then they perform the analysis of the creation of the game and start the production of the script, the game dynamics, and they define how the interdisciplinarity will occur. Finally, they play with the target audience (PROFESSOR 'MS.' U).

> My role was to guide them, to identify with them an object for the game because they had general themes. I helped them figure out the issue of the feasibility, define the subjects, determine how the project execution would be, the material and human resources involved, if they would be able to handle it on their own or if they would have to look for help regarding IT or using a 3D printer (...) Throughout the semesters, the integration of the different types of knowledge sometimes gets kind of lost, and I think that the game enabled them to realize how much they have already evolved in this educational process (PROFESSOR 'MS.' G).

The process of developing the games was not limited to the content taught, but was based on practices that imposed the redefinition of roles in the teaching and learning process, which covered from the discussion of the theme and initial ideas to the operationalization of what was imagined, demanding from the collective that was formed creativity, teamwork, cooperative interaction, exchange of experiences, the search for information, and the development of motor and informational skills. And during these associations between humans (students, professors, target audience, IT department) and non-humans (internet, books, computers, 3D printer, smartphones, cardboard, data, scissors, paint, etc), a network emerges, an implicated collective which performs an important cognitive policy that enables a new way of renegotiating the participation, the possibilities for action, and the relationships between students, professors, and available content and materials.

The production of knowledge through the development of games enables the students to participate, reflect, and understand what they do and what they produce, instead of being mere executioners or receivers of tasks, which contribute very little to their own education and autonomy. One can learn in the face-to-face classes, in reading, in the interaction with peers, and also with different technologies in the healthcare training process.

Regarding the relationships established within the health department, Professor 'Ms.' U states that her choice to use the creation of the game as a pedagogical strategy elicits the feeling of discredit among her peers.

> When I brought the discussion to the collegiate and to the department, there was always opposition. I think this happens among the majors in the healthcare field, because the folks are very keen on working with face-to-face approaches. I've heard people say "in her course the students only play games". The games, then, are seen

> as something inferior, that has little merit. It's a pity, because the games are a wonderful active methodology (PROFESSOR 'MS.' U).

This opposition and discredit towards games or other technologies as possible mediators in the training process is related to the notion of learning and the cognitive policy that is present in the professors' practices, where learning is based on a predetermined model in a recognitive approach and the professor has the role of the holder of a certain knowledge in relation to the student, leaving it up to the latter to learn it. The recognitivism, so intertwined in education, is not sleeping within the pages of books, it dwells in us (KASTRUP, 2005) and often in a silent manner. The assumptions of the representation model (the preexistence of a knowledgeable subject and a given world to be known and understood) are often so deep-rooted in teachers that they are mistaken for a natural attitude (KASTRUP, 2008). Therefore, even if teachers use movies, slide presentations, internet, applications, among others, in the teaching process, if the way of understanding cognition is not changed, the pedagogical practices will remain the same, just with a more modern appearance.

It is worth pointing out that the faculty members in the health department are, in their majority, specialist bachelors in their respective fields, due to the specific nature of the healthcare professions, and this initial training does not comprise curricular, pedagogical, and/or methodological content that deepens the discussions regarding the inventive use of technologies in the educational process. Rodrigues, Maraschin, and Laurino (2008, p. 15) point out that "teachers who have not experienced technology in their capacity building process, whether personal, educational, or professional, have more difficulty in inserting it into their classroom practices, being resistant to engaging with it. Even if teachers are hyper-connected individuals, who know how to use computers, internet, and applications, they are often unable to use these technologies to propose a collaborative research moment in class or to use a free application to mediate the learning of anatomy or public policies; they simply do not make this transposition. This teacher needs to establish, or be part of, a network that supports the inventive use of these artifacts in the teaching and learning process, that provides him/her with the construction of this competence, this new way of teaching, knowing, and learning.

The last experience described is regarding the smartphone, a technology that has received a lot of criticism from teachers for distracting the students, diverting their focus from the subjects being discussed in class.

> I promised myself that I will not compete with the cell phones. In class, some students were a little inattentive, so I asked them to search for the NANDA (*North American Nursing Diagnosis Association)* on the internet. They found the PDF file and started making the list that I had asked for. They started to become very cohesive, collaborative. In my mind I can't see it, but they can do everything using their cell phones. Today, this experience totally rearranged my day. Because I came for a lecture class and they were going to leaf through books. Then, in the interaction, they ended up turning into groups around cell phones. The use of the

cell phones was an unexpected thing that showed up, there was no motivation behind it, I hadn't planned it, there is no lesson plan whatsoever for it. This was so true that a student even said 'Just last Sunday I watched a teacher on "Globo Universidade", or "Globo Ação", I don't know, using the cell phone in her class methodology' (PROFESSOR 'MR.' H).

Smartphones have been used, albeit in an incipient way, as pedagogical resources in the classroom with the perspective of using this technology as an ally to the goal of having the student focus on the class, that is, interacting with a generation that lives/thinks in a technological way. Nevertheless, encouraging the exercise of reading on the smartphone represents an instrumental practice that only changes the reading support medium. Once a book, now a mobile device. In order for education to perform in a creative and powerful way, it is necessary to force thinking and to go beyond the recognitive experiences (KASTRUP, 2008), destabilizing the invariable certainties so that education can be questioned and not just replicated. It is necessary to expand the possibilities regarding cognition and motivate the construction of different teaching practices and new ways of knowing. Consequently, smartphones should be thought of as problem-solving agents, but above all, to produce the invention of problems, and not just be limited to being a new support for reading.

The use of the smartphone by Professor 'Mr.' H came up as a response to the students' concerns, which is valid from the perspective of legitimizing the technology culture brought by the students to the teaching and learning process, and it also shows that the educator is open to the possibility of creation in his practices, of the construction of an activity mediated by contemporary technological devices from the activation of new flows, new agencing, new entanglements. Another point to be highlighted concerns the moment when the professor states that his class was totally rearranged when he authorized the students to use their smartphones to handle the digital file and carry out the planned task. He noticed the rearrangement of the room, the grouping around the cell phones, greater interaction, concentration, and motivation. The smartphone in this collective was another player in the training process, which acquired shape and meaning in the interaction on the network, influencing and changing the interactions in the classroom.

In the absence of innovation mobilized by the professors in their pedagogical practices, the network formed at the university tends to stabilize itself in recognitive habits and structures, called "black box". And, because the black box is a stable and well-settled fact, an unquestioned truth, we relate to it and do not pay much attention to it (LATOUR, 2012). In this case, the professors go on teaching their undergraduate students, they adapt to the technologies made available by the university, and replicate a way of teaching that at times is considered creative (a different way to respond to the same problem), but does not embody any form of inventiveness. However, whenever the black box encounters some opposition, some obstacle in its circuit, we face a moment of controversy. When some professors institute non-linear, problematizing, and non-hierarchical pedagogical practices (games, photo shoots,

connections between health and works of art, smartphones), they establish contradictions with the established reality, enabling the establishment of controversy, of points for the development of much more powerful articulations for the education of healthcare professionals.

I see the inventive use of technologies (digital and analog) in the healthcare training process as the rise of new interpretations and new ways of understanding knowledge production, which carry out the agencing of students to different directions and lead to transformations (LATOUR, 2012), producing other forms of learning and knowledge in healthcare. What happens at this point is a shift from the task of just finding the solution to existing problems or the task of acquiring more information (the more one knows things, the more one has knowledge) to the idea that the more one knows, the more one can learn, create, and produce realities, and to oneself, in collectives.

FINAL CONSIDERATIONS

Cognitive policy generates agencing environments which engender methods of teaching and of producing knowledge. And it is through the pedagogical practices that the teachers perform, consciously or unconsciously, such policy and establish that the learning process, the knowledge, the perception of oneself and of the world occur in a certain way.

In this technological society, it is necessary that healthcare education extrapolates the educational practice based exclusively on the recognitive policy – which stores and replicates information, with experiences that lead to stability and to a non-innovative replication – if we wish healthcare education to be able to perform in a creative and powerful way. For this purpose, it is necessary to force thinking and to motivate the practice of a cognitive policy that enables experimentation and invention.

The pedagogical experiences described above indicate that it is possible to support healthcare education in an inventive policy, which expands the potentialities associated with cognition and fosters a liberating, creative, inventive, and collaborative healthcare education. It is necessary to (re)think of the university as a place for the production of several types of knowledge, to make it a place to experience education as the production of oneself and of new worlds/realities, not limited to a methodical or technicist knowledge. This means to live multiple and meaningful experiences derived from education and from the different technologies.

A limitation that we can point out in this study is related to the fact that we were not able to interview professors from all health majors, seeking a more complete picture regarding the several cognitive policies performed in the teaching process within the health department.

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