

Use of case reports and fish-bowl to complement the teaching of biochemistry for medical courses

Uso de casos clínicos e fish-bowl complementando aulas expositivas no ensino de bioquímica para cursos de medicina

Andréia Machado Cardoso^{1*}, Flávia Medeiros Dutra Reis², Lorryayne Camila Moreira³,
Maurício Lanzini⁴, Mayara Luiza da Silva Lopes⁵

Cardoso AM, Reis FMD, Moreira LC, Lanzini M, Lopes MLSLS. Use of case reports and fish-bowl to complement the teaching of biochemistry for medical courses / *Uso de casos clínicos e fish-bowl complementando aulas expositivas no ensino de bioquímica para cursos de medicina*. 2021 Nov-Dec;100(6):554-60

ABSTRACT: This paper describes a successful experience in combining traditional and active methodologies in teaching biochemistry to medical students. In it were combined the traditional methodology, with lectures and resolution of questions, and active methodology, the fishbowl and application of clinical cases, in teaching the structure and function of proteins. This activity led students to search for answers to reply to the questions and support their arguments during the discussion with other colleagues, transforming them into active and participative subjects in the construction of their knowledge. At the end of the activity, it was observed the effectiveness of the combination of the active and traditional methodology as tools of more lasting knowledge and that meets the current demands of health professionals.

Keywords: Medicine/education; Biochemistry/educaçã; Methodology; Education, medical; Educational measurement/methods; Learning; Teaching.

RESUMO: Este artigo descreve uma experiência exitosa na combinação de metodologias tradicionais e ativas no ensino de Bioquímica a alunos do curso de medicina. Nela foram mescladas a metodologia tradicional, com aulas expositivas e resolução de questões, e metodologia ativa, o *fish-bowl* e aplicação de casos clínicos, no ensino da estrutura e função das proteínas. Tal atividade levou os alunos a buscarem as respostas para responder às questões e sustentar seus argumentos frente à discussão com outros colegas, transformando-os assim em sujeitos ativos e participativos na construção de seu conhecimento. Ao final da atividade, foi observada a eficácia da junção da metodologia ativa e tradicional como ferramentas de um conhecimento mais duradouro e que atenda às atuais demandas dos profissionais da saúde.

Palavras-chave: Medicina/educação; Bioquímica/educação; Metodologia; Educação médica; Avaliação educacional/métodos; Aprendizagem; Ensino.

1. PhD in Biological Sciences: Toxicological Biochemistry, Teacher of Medicine, Federal University of Fronteira Sul, Campus Chapecó, Chapecó, SC, Brasil. <https://orcid.org/0000-0003-4243-8855>. E-mail: andrea.cardoso@uffs.edu.br.

2. Medicine Student, Federal University of Fronteira Sul, Campus Chapecó, Chapecó, SC, Brasil. <https://orcid.org/0000-0003-1232-5534>. E-mail: flaviandreiss@gmail.com.

3. Medicine Student, Federal University of Fronteira Sul, Campus Chapecó, Chapecó, SC, Brasil. <https://orcid.org/0000-0002-4339-5300>. E-mail: lorraynecamila497@gmail.com.

4. Medicine Student, Federal University of Fronteira Sul, Campus Chapecó, Chapecó, SC, Brasil. <https://orcid.org/0000-0002-6685-903>. E-mail: lanzini mauricio123@gmail.com.

5. Medicine Student, Federal University of Fronteira Sul, Campus Chapecó, Chapecó, SC, Brasil. <https://orcid.org/0000-0003-2966-3118>. E-mail: may.lope33@gmail.com.

Correspondence: Prof.a Dra Andréia Machado Cardoso. Universidade Federal da Fronteira Sul - Campus Chapecó. Rodovia SC 484 - Km 02, Fronteira Sul, CEP 89815-899. E-mail: deiaa.mc@gmail.com ou andrea.cardoso@uffs.edu.br

INTRODUCTION

The teacher is often faced with the following questions: “What will I need this knowledge for?”, “Where will I apply this knowledge?”. Or even with statements such as: “this sort of knowledge has no relevant meaning”; “I do not need biochemistry to be a doctor”. Thus, the teaching of basic biochemistry for the medical course is a great challenge for teachers. In addition, the new National Curriculum Guidelines for Medical Education advocate the training of generalists, humanists, and critical and reflective professionals, capable of meeting the current needs of the population¹. Such questions raise the need for changes in the way in which knowledge is transmitted in medical education.

Thus, the structure of the undergraduate course in Medicine, in an attempt to meet the new National Curriculum Guidelines and make the student understand the importance of different types of knowledge, should use methodologies that privilege the active participation of the student in the construction of knowledge and the integration between the contents¹. In order to carry out these activities and improve teacher-student communication, the teacher must be aware of the possible challenges that the teaching of active methodologies may require.

In addition, you should know the facilitating resources they have available, an example is MOODLE (Modular Object-Oriented Distance Learning). It is a teaching and learning management platform used in several educational institutions. It uses communication technologies, providing virtual learning environments, being an alternative to expand and complement the conventional classroom. This occurs through interaction between teacher and student through chats, forums, delivery, and correction of work. In addition, it allows the educator to make available their classes, references of the content seen in the classroom, exercises, opinion polls, among others².

In the teaching of Biochemistry, one of the greatest challenges for students is the association of contents with what is done in professional practice, which leads to a decrease in interest in understanding complex molecular processes³. Thus, professors should seek to integrate biochemistry contents with practical activities that sharpen students' perception of the importance of this subject in their future profession, something that can be achieved through active methodologies. For this, different teaching-learning resources can be used, such as the use of clinical cases and fishbowl.

The use of clinical cases is an important teaching-learning tool for the undergraduate course in Medicine. The development of clinical reasoning is one of the most essential skills within the medical field and must be acquired and developed by students throughout their

graduation and in the practice of their profession. According to Peixoto et al⁴ “for the development of clinical reasoning, in addition to biomedical knowledge, it is necessary for the student to be exposed to clinical problems repeatedly, in order to allow the construction of mental schemas of diseases.” To achieve this goal, the use of clinical cases is extremely interesting.

Another dynamic teaching methodology is the Fishbowl, which was created at Stanford University and inspired by medical schools. It is an interactive experience, which enables the development of communication skills, exchange of experiences between participants, and the transfer of knowledge. This learning method can be either open or closed. In the open one, a group of people sits in a circle that has an additional empty chair to debate different issues and is surrounded by a larger group in an outer circle. The empty chair can be occupied by a member of the outer circle who wants to participate in the discussion at any time. After the additional participant makes their statement, someone should leave the chair to allow another outside member to continue the discussion. In a closed fishbowl, the class is divided into two groups (or more, as needed) and assigns the discussion role to one group and the observer role to the other⁵.

However, for the formation of this clinical reasoning, it is necessary, first, the consolidation and fixation of biomedical knowledge, which can be achieved by traditional teaching⁴. Traditional education has as its main function the transmission of knowledge, being common for its realization the use of lectures and the application of exercises. This method is based on passive learning by the student, on a hierarchical relationship between teacher and student, the former being the holder of knowledge, and on repetition and memorization of concepts and formulas. The main positive point of this methodology is the simplification of the process of learning new/unknown content by the student, as this is presented in an easy way to the student, with both the explanation and the development of reasoning for the teacher, and for the student, only its assimilation. In addition, in traditional education, there are more structured classes and the teacher can direct the class and the students' further study towards the most relevant aspects of the subject⁶.

The aim of this study was to describe the performance of an activity in the teaching of basic biochemistry which mixed traditional and active teaching methods, proving the effectiveness of joining these methodologies as tools for a more lasting knowledge that meets the current demands of health professionals.

METHODOLOGY

The content to be worked on was the structure and function of proteins, a mandatory content in basic

biochemistry classes. The first phase class of the medicine course had 40 students. We can divide the methodology used into three different moments:

1. First, an expository-dialogued class was developed, focusing on the three-dimensional structure of proteins. This class lasted two hours and covered everything from the characteristics of the side chains of all amino acids to how the quaternary structure of a protein is formed. At this time, students appropriated their knowledge at the molecular and chemical level of protein formation.

2. As an activity to be performed outside the classroom, a clinical case about sickle cell anemia was inserted in Moodle. The case already had a diagnosis and contained 6 questions that dealt with everything from hemoglobin function to biochemical mechanisms of sickle cell anemia. Students should individually answer all the questions and take the answers noted on a notebook sheet to the next in-person class. The estimated time to resolve issues is 2 to 4 hours.

CLINICAL CASE

A 15-year-old African-American girl goes to the emergency room complaining of bilateral pain in her thigh and hip. The pain has been present for a day and it's increasingly intense in terms of severity. Acetaminophen and ibuprofen did not alleviate its symptoms. She denies any recent trauma or excessive exercise and reports that she has been feeling tired and burning while urinating, along with increased urinary frequency. The patient reports having had similar pain episodes in the past, sometimes requiring hospitalization. On physical examination, she is afebrile (no fever) and not in acute distress. No one in your family had similar episodes. Her connective and mucous membranes are somewhat pale in color. bilateral nonspecific lesion on the anterior part of the thigh with no apparent anomaly. The remainder of her exam is normal. Her white blood cell count is high, at 17,000/mm, and your hemoglobin level is down to 7.1 g/dL. Urine analysis showed an abnormal number of several bacteria.

1) What is the most likely diagnosis?

ANSWER: Sickle Cell Anemia

2) What is the biochemical mechanism of the disease?

3) Describe the difference between healthy and sickle hemoglobin synthesis.

4) How is the transport of gases in healthy and sickle hemoglobin?

5) Is hemoglobin a globular fibrous protein? Why?

6) Does hemoglobin have a tertiary or quaternary structure? Explain.

7) What is the pathophysiological mechanism of symptoms?

Topics for Study:

- Amino Acids and Protein Formation
- Protein Structure and Function
- Hemoglobin Function

3. In the second class, lasting 4 hours, the students were first instructed to analyze again the clinical case and the answers to the questions, individually. The time given for this activity was 20 minutes. Afterward, the "open fishbowl" started. The students were then gathered in trios and had to compare their answers and reach a final conclusion about each question in the clinical case. The time given for this moment was 30 minutes. Then, two trios were brought together, forming groups of 6 or 7 people. As a group, the students should again compare the answers, discuss them and reach a conclusion. The consultation in textbooks, articles, and websites was allowed and encouraged from the beginning of the activity. The group's final responses should be transcribed on a notebook sheet. The groups had 30 minutes for this activity. It was observed that both in trios and in groups, there was a lot of discussion

among students. Even the timidest ones defended and argued in favor of their answer when eventually confronted by the other students. There was a lot of consultation in textbooks and articles, especially at times of disagreement. There was also a good argumentative and explanatory ability on the part of most students.

The final part of the open fishbowl consisted of each group choosing a representative who would expose what was discussed by the group in the center of a large circle. Thus, a large circle was organized with the students' desks almost touching the four walls of the classroom, and a mini circle composed of 7 desks in the center of the larger circle. In this mini circle were the 6 representatives of the groups and an empty desk, characterizing the open fishbowl. The students in the small circle were to discuss the issues again, this time aloud, for others to hear. Students placed

in the large circle should only observe the discussion of colleagues, not being able to express an opinion. If anyone in the large circle wanted to express an opinion on what was being discussed, they should sit in the seventh seat. If that happened, one of the other students could leave the small circle, always keeping an empty desk to allow another student to take a seat.

It was observed that the students who were in the minicircle were quite ashamed of having to expose and discuss their answers out loud. However, it was a very important moment to develop this kind of skill. Small disagreements occurred during the exposures of the answers, but they were quickly resolved among the minicircle participants. Only two students who were in the large circle sat in the empty chair in the minicircle, however, many later reported that they felt a great desire to go to the center but were impeded by shyness. It is important to make it clear that going to the empty chair is optional and that only the most proactive and uninhibited students are expected to do so. There is not enough time or space for the whole class to occupy/want to occupy the empty chairs.

It is noteworthy that the teacher's role during the fishbowl is only to mediate the activity, indicating the organization of groups and the time for each phase of the class. Small conflicts between students in moments of disagreement about the content should not be resolved by the teacher; it should encourage students themselves to seek arguments in the literature to resolve differences, and may only indicate reference material.

The closing of the activity was carried out in an expository way by the teacher with the aid of projected images in order to summarize and illustrate everything that had been discussed by the students. Finally, a conversation wheel was held to assess the effectiveness of the activity (clinical case + fishbowl) and 96% of the class evaluated it very positively regarding the development of communicational, argumentative, respect for the colleague and, mainly, regarding the apprenticeship. Only two students did not evaluate the activity positively and reported that they prefer traditional classes.

The effectiveness of learning was also observed in the traditional assessment, carried out through discursive and objective questions about the contents of the curricular component. This type of assessment is part of the student's final grade in the component. In the evaluation that contained questions related to the content worked through the clinical case plus the fishbowl activity, 92% of the students answered all questions regarding the content working with this mixture of methodologies correctly.

RESULTS E DISCUSSION

In the activity, at first, an expository class was held with a focus on the three-dimensional structure and

function of proteins, using a traditional teaching process to educate students about the subject, giving the minimum necessary so that they could, later, research on your own about the topic covered. In this method, the teacher is the center of the teaching-learning process, being responsible for passing on knowledge. The advantages of the traditional methodology, with lectures and exercises, are greater control of the content of classes and their development, creation of habits, simplification of the subject, and the guidance that the teacher can give students according to the relevance of the subjects⁷. For the greatest effectiveness of this teaching model, it is essential that the educator is able to motivate students when teaching the content, since the way in which knowledge is transmitted influences the interest of students⁸.

The proposition of a clinical case on sickle cell anemia inserted in MOODLE can be considered both a traditional and an active form of methodology. It aims to identify whether students can solve the questions about the case based on the knowledge acquired in class and in different databases. By allowing the exercise to be carried out outside the classroom environment, allowing the consultation in textbooks, articles, and websites, this activity enabled the development of search, selection, and evaluation skills of the information contained in the databases⁸. Another issue to be mentioned in relation to the application of a clinical case is to show the importance and applicability of biochemical knowledge in medical practice.

Although the traditional methodology has advantages, often through expository-dialogued classes, learning remains at the first few levels, that is, knowing and understanding knowledge, leading the student to an extremely passive learning process. In addition, this model does not address all the competencies and skills that are expected to be developed by the student throughout their graduation.

However, for Lopes⁹ (p.30):

The teaching strategy "dialogued expository class" can be described as an exposition of concepts, with the active participation of students, where prior knowledge is extremely important, and this should be considered the starting point. The teacher leads students to question, discuss, interpret the object of the study presented by him, recognizing and contextualizing this object with the situations of realities that can be raised by the students.

Thus, the dialogue would work as a way to overcome passivity, aiming at the interaction between students and sharing reasoning with the teacher. However, this method would only work as a starting point, in order to instigate students to delve into the subject⁹.

Aiming to develop other skills not covered by this method, the fishbowl was performed. In it, students were able to develop skills: research and proactivity, with database investigation to support their answers;

communication, with discussion, debates, and explanations about their answers and possible differences; teamwork, so that consensus could be reached within the group and accepting the arguments of colleagues; and decision-making, when choosing the best answer and who would explain it during the later phase of the activity.

The process of forming clinical reasoning involves some steps, such as the consolidation of biomedical knowledge, the fixation of such knowledge, and the formation of disease scripts⁴. At each step, different methodologies can be used. In the consolidation of biomedical knowledge (basic cycle of the Medicine course), it is interesting that lectures are more applied since it is the student's first contact with medical knowledge and their previous knowledge in the area of health is almost nil. In the stage of fixing biomedical knowledge (clinical cycle of the Medicine course), active methodologies such as the use of clinical cases are important because they allow the student to use the knowledge acquired from the previous cycle and apply it in different contexts. In the stage of forming disease scripts, the internship (last cycle of graduation in Medicine) is essential, as repetition leads to the improvement of clinical reasoning, making it possible to build the mental schemes of pathologies⁴.

It is important to emphasize that, in this type of active teaching, the student has the role of looking for the information necessary to solve what is proposed, and the teacher is only responsible for mediating and instructing them, that is, the use of active methodologies requires flexibility from the teacher and articulation capacity, as they are tools to reach the active, critical subject, capable of transforming and transforming his/her context. Thus, the teaching techniques used must allow for the representation of the set of issues, encouraging communication, teamwork, the contracts that are made, as well as the forms of coexistence, allowing for expression and taking into account the time of each student's learning.

According to Rehfeldt¹⁰:

It is essential, therefore, that the educator feels motivated to participate in this process and understands the constant professional improvement as a condition for the pedagogical practice to be in tune with social demands and to respond to today's challenges. It is understood that this means that university professors must develop skills and competence that go beyond those acquired in their bachelor's or master's education.

According to Oliveira et al.¹¹, just including a new method is not enough to provide improvements in student learning, and teachers must constantly assess the results obtained by the change.

With regard to the profile of students, they tended to be more active than passive, preferring to be submitted to mixed methodologies instead of exclusively expository classes. However, during the activity, only two academics

from the large circle sat in the empty chair of the minicircle, showing the students' resistance to innovative tasks. According to the participants' reports, the main reason for so little interaction was shyness, but one should also think about a possible lack of interest, motivation, or commitment to their own learning. These factors can be modified over time and the difficulties minimized, and the teacher should seek to understand the class and seek appropriate methodologies to encourage students.

Communication is an important tool in medical education. According to Brasil¹, medical graduates must know how to communicate properly with patients, co-workers, and the patient's family members, as well as seek strategies aimed at therapeutic adherence and health promotion, prevention, and rehabilitation through communication skills. The active methodology uses constant interaction between peers and teachers to develop this skill. The reflection on the situation discussed leads the student to issue an opinion about the situation, argue for or against and to express themselves always respecting the different opinions that emerged in the group, which meets what is recommended by the National Curriculum Guidelines¹².

Along with the development of communication, there is a need to overcome shyness. According to Esteves¹³, shyness is an important barrier to the exposition of ideas, as well as the defense of points of view, in addition to hampering proper reasoning due to the constant thought of embarrassment. In this way, active methodologies allow the student to impose himself more and more during the teaching-learning processes, leading to autonomy and critical capacity, fundamental characteristics that must be presented by the professional.

To overcome the barriers of shyness and motivate students to become active in their learning process, greater applicability of active teaching methodologies in the university context is needed. According to Oliveira¹⁵, motivation makes learning more effective, as it makes it more playful and pleasurable, creating a more favorable environment for fixing content and building knowledge. Thus, it is recognized, as a possible weakness of the study, the applicability of the fishbowl in just a single episode with the reported class, and it should be applied more often so that, gradually, students feel more comfortable with it and, subsequently, participate in the great debate in a more solicitous and calm way than only when they have had contact with the methodology only once.

On the other hand, a strong point of the fishbowl methodology is to allow discussion among students about the problem being worked on. According to Borges et al.¹⁶, dialogue, respect for different opinions, and reaching common conclusions are fundamental characteristics for professionalism in the labor market, configuring important gains related to active methodologies.

In the uniquely traditional methodology, there is an intellectual dependence of academics on the teacher, with the information being transmitted by the teacher, often only memorized by the student. Therefore, given the need to solve problems, the knowledge acquired by this method proves to be insufficient¹⁷. Thus, the proposed activity, by mixing traditional and active methodology, enabled students to work through the difficulty of solving problems in an unprecedented situation, consolidating learning by applying knowledge with a more autonomous and more active posture.

CONCLUSION AND FINAL REMARKS

The results obtained in this report demonstrate

that the combination of active and traditional teaching methodologies proved to be positive for learning biochemistry in the medical course. This can be seen both by the expressive amount of correct answers in the assessment and by the approval of the students. This finding exposes the importance of implementing new learning methods by the teacher, enabling the active participation of the student in the learning process. According to Wall¹⁴, it is important that teachers learn about different pedagogical activities, or seek to create new forms of teaching since there is no ideal way to address all the contents and that the potential of each methodology is in the way of using them. The combination of different methods arouses student interest, increases learning possibilities, and contributes to achieving the objectives of the teaching proposal.

Authors' participation: *Andreia Machado Cardoso*: guidance and coordination of the students; final review of the article. *Flávia Medeiros Dutra Reis*: text writing; bibliographic/theoretical survey. *Lorraynne Camila Moreira*: text writing; bibliographic/theoretical survey. *Maurício Lanzini*: text writing; bibliographic/theoretical survey. *Mayara Luiza da Silva Lopes*: text writing; bibliographic/theoretical survey.

REFERENCES

1. Brasil. Ministério da Educação. Diretrizes Curriculares Nacionais do Curso de Graduação em Medicina. Brasília; 2014. Disponível em: <http://portal.mec.gov.br/cne/arquivos/pdf/Med.pdf>.
2. Mezzari A, Iser I, Wiebbeling AMP, Tarouco L. The Moodle as a reinforcement to classroom teaching of course parasitology and mycology in undergraduate medical course. *Rev Bras Educ Med*. 2012;36(4):557-63. doi: 10.1590/S0100-55022012000600016.
3. Cavalcante GHO, Araújo CRF, Lima FS, Costa MS, Pereira HWB, Souza ID, Fonseca JT, Sara Costa EL, Lanza DCF. Bioquímica médica – casos clínicos. *Rev Ensino Bioquímica*. 2017;15:2318-8790. doi: 10.16923/reb.v15i0.708.
4. Peixoto JM, Santos SME, De Faria RMD. Processos de desenvolvimento do raciocínio clínico em estudantes de medicina. *Rev Bras Educ Med*. 2018;42(1):73-81. doi: 10.1590/1981-52712015v41n4RB20160079
5. Mucke J, Anders HJ, Aringer M, Chehab G, Fischer-Betz R, Hiepe F, Lorenz HM, Schwarting A, Specker C, Voll RE, Schneider M. Swimming against the stream: the fishbowl discussion method as an interactive tool for medical conferences: experiences from the 11th European Lupus Meeting. *Anne Rheum Dis*. 2019;78(5):713-4. doi: 10.1136/annrheumdis-2018-214160.
6. Leão DMM. Paradigmas contemporâneos de educação: escola tradicional e escola construtivista. *Cad Pesq*. 1999;(107):187-206. doi: 10.1590/S0100-15741999000200008.
7. Pinho ST, Alves DM, Greco PJ, Schild JFG. Método situacional e sua influência no conhecimento tático processual de escolares. *Motriz: Rev Educ Física (Rio Claro)*. 2010;16(3):580-90. doi: 10.5016/1980-6574.2010v16n3p580
8. Kruger LM, Ensslin SR. Método Tradicional e Método Construtivista de Ensino no Processo de Aprendizagem: uma investigação com os acadêmicos da disciplina Contabilidade III do curso de Ciências Contábeis da Universidade Federal de Santa Catarina. *Rev Org Contexto (São Bernardo do Campo)*. 2013;9(18):219-70. doi: <https://doi.org/10.15603/1982-8756/roc.v9n18p219-270>.
9. Lopes TO. Aula expositiva dialogada e aula simulada: comparação entre estratégias de ensino na graduação em enfermagem. São Paulo: Universidade de São Paulo, Escola de Enfermagem; 2012. doi: 10.11606/D.7.2012.tde-16052012-104658.
10. Rehfeldt MJH, Bersch ME. Fórum Virtual de Professores: uma experiência na formação continuada. Disponível em: http://www.ufrgs.br/niece/eventos/RIBIE/2008/pdf/forum_virtual_profesores.pdf.
11. Oliveira AP, Carvalho ES, Lage-Marques JL, Cavalli V, Habitante SM, Raldi DP. Evaluation of a strategic practice demonstration method applied to endodontic laboratory classes. *Rev Odonto Cien*. 2012;27(2):127-31. doi: 10.1590/S1980-65232012000200006.
12. Diesel A, Baldez ALS, Martins SN. Os princípios das metodologias ativas de ensino: uma abordagem teórica. *Rev Thema*. 2017;14(1):268-88. doi: 10.15536/thema.14.2017.268-288.404.
13. Esteves AL. A timidez na perspectiva da psicologia analítica [Dissertação]. São Paulo: Pontifícia Universidade Católica de São Paulo; 2012. Disponível em: <https://repositorio.pucsp.br/jspui/handle/handle/15234>.
14. Wall ML, Prado ML, Carraro TE. The experience of undergoing a Teaching Internship applying active methodologies. *Acta Paul Enfermagem*. 2008;21(3):515-9. doi: 10.1590/S0103-21002008000300022.

15. Oliveira ES. Motivação no Ensino Superior: estratégias e desafios. *Rev Contexto Educ.* 2017;32(101):212-32. doi: <https://doi.org/10.21527/2179-1309.2017.101.212-232>.
16. Borges MC, Chacá SGF, Quintana SM, Freitas LCC, Rodrigues MLV. Aprendizado baseado em problemas. *Medicina (Ribeirão Preto)*. 2014;47(3):301-7. doi: <https://doi.org/10.11606/issn.2176-7262.v47i3p301-307>.
17. Torres V, Sampaio CA, Caldeira AP. Ingressantes de cursos médicos e a percepção sobre a transição para uma aprendizagem ativa. *Interface Comun Saúde Educ.* 2019;23:e1700471. doi: <http://dx.doi.org/10.1590/interface.170471>.

Received:2020, April 02

Aceito: 2021, November 24