

The use of theater to teach the biological cycle of life

Maria Gisele dos Santos * and Cinthia Lopes da Silva

Department Physical Education, Federal University of Parana, Brazil.

World Journal of Advanced Research and Reviews, 2024, 21(01), 249–253

Publication history: Received on 19 August 2023; revised on 28 December 2023; accepted on 31 December 2023

Article DOI: <https://doi.org/10.30574/wjarr.2024.21.1.2048>

Abstract

The Physical Education courses are mainly composed of disciplines related to biological, human, and social sciences. In general, students have difficulties in understanding specific knowledge of biological sciences such as physiology. The purpose of this work is to describe and analyze a pedagogical experience in which the language of theater was used in the classroom to enable students to access bioenergetic content, a component of physiology. The pedagogical experience was carried out in a planned situation of classes at a public university in southern Brazil in the year 2023 and had the participation of about 40 students. The results indicate that the theater enabled the subjects to produce multiple meanings to the treated content, indicating that the students understood the concepts worked on the theme. The fundamental elements in the process were the increase in interaction between students and the sharing of meanings between teacher and students.

Keywords: Physical Education; Language; Theater; Cycle of Life; Students

1. Introduction

Physical Education courses are made up of subjects related to biological, human and social sciences, mainly. The tradition of the area involves a didactic problem for higher education teachers to work in a way that, in many cases, disregards the training and prior knowledge of students, their needs and difficulties, the result of an educational base that originates from didactic failures.

In the case we will deal with here, the course is aimed at training teachers in Physical Education who will work in Basic Education. Attention to teaching and learning modes in higher education is essential for students to learn how to learn so that they can teach in the future.

Bioenergetics is one of the main components of physiology, therefore, of biological sciences. Most of them are dedicated to the study of various chemical processes that make cellular life possible from an active perspective. As a content of biological sciences applied to different courses, including Physical Education, it is traditionally a type of knowledge that requires mastery of concepts and the functioning of the body internally. Unlike other disciplines, the human and social sciences, for example, which are characterized by a reflective aspect and with references close to the students, as they have experienced social problems in previous school years, such as in Basic Education, and have some reference to humanities themes. such as prejudices, ethical-moral issues, the issue of differences, etc.

In this study we sought to describe and analyze how theater included in the planning of bioenergetics classes for a Physical Education course can enable students to access abstract knowledge such as the fundamental chemical processes that occur in cells and analyze the physiological effects of these processes. Understanding what "energy" means and how the body can acquire it, transform it, store it and use it, is the basis for understanding organic functioning in high-performance sports, as well as in recreational and leisure activities. . The study of bioenergetics allows us to

* Corresponding author: Maria Gisele dos Santos; <https://orcid.org/0000-0003-1904-1235>

understand how the ability to perform work (exercise) depends on the gradual transformation of one form of energy into another. The physiology of muscle function and exercise is basically about converting chemical energy into mechanical energy.

Theater is part of the knowledge of the arts and its expression takes place through this specific language, artistic, which is why it facilitates access to knowledge and, in this specific case, knowledge of bioenergetics. However, theater alone is not enough to teach school content of different natures, in this case, the set of classes taught and the way in which the teacher constructed the classes were fundamental so that theater could mobilize in students the necessary incentive to the production of multiple meanings attributed to the topic under discussion, bioenergetics.

2. Method - The construction of the pedagogical experience

The pedagogical experience was carried out in the discipline of Child and Adolescent Physiology – Bioenergetics and involved the implementation of a sequence of planned activities using practical activities carried out using internet games, reading scientific articles and theater. Theater is extremely motivating for young people; affects them emotionally, cognitively, motorically, and socially. It also requires mobilization of attention, perception and memory, textual understanding, ability to work with expressiveness and imagination. These aspects relating to the reality of young adults are commonly disregarded as significant. Considering the aspects related to theatricalization and the importance of inserting different activities into everyday academic life, theater was used as a means to acquire knowledge related to cellular metabolism: photosynthesis, cellular respiration, anaerobic glycolysis, aerobic system and muscle contraction.

The subject of Child and Adolescent Physiology, which deals with the content of bioenergetics, is part of biochemistry, which is a science that has developed considerably, making development increasingly complex for undergraduate students in the Physical Education Course. Since these subjects only had one subject in the health area in the university course where the pedagogical experience was carried out. Not having enough knowledge to go deeper into the content. The subject, although presented with coherence and organization, seeking to contextualize it with the practice of physical activity and the subjects of the course for which it is proposed, is generally defined by students as a set of chemical structures and reactions, difficult to decipher. This knowledge, if not understood, will hinder activities that will be developed in the future-by-future teachers in public and private schools for children and young people.

Due to this difficulty in learning theoretical and practical bioenergetics content, theater was included in the teaching program. Didactic resources can be understood as a learning tool used by the teacher, with the aim of promoting the mediation process between knowledge and the student. However, we understand theater as more than a mere teaching resource, a form of expression and manifestation based on art and consequently, a means of producing multiple meanings. After the inclusion of theater in the teaching plan, students from the Degree in Physical Education participated in what was proposed, with each pair being responsible for a stage of the breathing and photosynthesis process and exercises previously explained about bioenergetics.

In total, the class was made up of around 40 students, the pedagogical experience was carried out in the first semester of 2023.

These first two classes were implemented according to the interpretation discussed in "Photosynthesis" and "Cellular Respiration". Therefore, we tried to provoke the students, to find out what their prior knowledge was about the content. Many difficulties were observed in students' understanding of the subject. The task proposed to the students was to carry out research in their own notebooks, on the topic of photosynthesis and cellular respiration, with the aim of continuing the main concepts related to this mechanism.

At first, the content of the previous class was continued and then two videos were shown on: "Photosynthesis" and "Cellular Respiration" After reading, the task was to work with the students to discuss, answer questions and discuss the content covered. in the book. Therefore, in this class, visualization and annotation were also used, as well as interaction with audiovisual media.

In the following class, examples of teaching materials such as internet games were presented to students through scientific articles. After presenting the information, the students and the teacher formed groups. Each group met to define what type of game would be covered in the practical class, in order to use the predominant system in each game, such as the topics "Aerobic System" and Anaerobic System in Physical Activity".

The last class was dedicated to theater production. The students in the class presented a theatrical play, following the topics covered in classes, videos, reading scientific articles and playing internet games, with the themes: "Photosynthesis and the creation of oxygen", "Cellular Respiration", "Muscle Contraction", "Aerobic System" and The Anaerobic System in Physical Activity".

In terms of the pedagogical theoretical basis for the interpretation of classes, the references are Bakhtin (1987, 1990), Freire (1998, 2001) and Rodrigues Júnior e Silva (2008), in addition to the support of more recent productions by Silva et al (2022) and Silva, Ferreira and Bonin (2022).

One of the authors of the article was the teacher leading the subject and class under discussion and the other author collaborated with the analysis of the data obtained, making the strangeness and interpretation of the pedagogical experience carried out in order to make it possible to transform the data into researchable forms.

3. Results and discussion

3.1. The theater

Initially, we work on knowledge related to cellular metabolism, especially photosynthesis, a process carried out by plants, as well as the relevance of photosynthesis for maintaining the environment, its relationship with the food chain, cellular respiration, food substrates, muscle contraction, anaerobic system and aerobic system during exercise. In this sense, a practice was carried out that began with a brief explanation of the concepts that guide cellular metabolism, photosynthesis, such as how photosynthesis and cellular respiration occur. After the teacher explained and discussed the subject, the room was organized into small groups to create a small theater. The themes proposed for the teams to develop the theater were: "Photosynthesis and the production of Oxygen", "Cellular Respiration", "Muscle Contraction", "Aerobic System" and Anaerobic System during Physical Activity".

The subject teacher gave narratives on the topics "Photosynthesis and the production of Oxygen", "Cellular Respiration", "Muscle Contraction", "Aerobic System" and "Anaerobic System during Physical Activity" and the students acted out the events.

3.2. The teacher's narrative

Our bodies metabolize the food we eat into a form of energy that can be used for muscle contraction. It occurs in skeletal muscle through the interaction between two protein fibers in the sarcomere (actin and myosin). The myosin head presses on the actin filaments. contract the muscles. Under comfortable conditions, when the muscles are relaxed, the junction between these fibers is occupied by a third protein called tropomyosin, which surrounds the actin filaments. Consequently, for contraction to occur, tropomyosin must release a binding site between actin and myosin. Additionally, the myosin head must move to reach the actin filaments and cause "pushes." In summary, muscle contraction requires two usual actions: a) movement of the myosin head to reach actin; b) the release of the actin filament from this point of attachment, that is, in the conditions of muscle relaxation occupied by tropomyosin. This is the energy used by the myofibrils to cause the myofilaments to move, resulting in muscle movement and force production. To understand the energy needs of any physical activity, it is important to know it in depth. The success of any movement task is considered efficient energy conversion. It is directly proportional to the energy demand of the skeletal muscles involved in this activity. Energy expenditure depends on many factors such as type, frequency, duration and intensity of physical activity, characteristics of the diet, conditions of physical activity (altitude, temperature and humidity), physical condition and muscles of individuals and types of fibers (types I and II) . The energy required for resting metabolism and physical activity comes from energy reserves in muscles and the metabolism of macronutrients, carbohydrates, fats and proteins. The main energy source for the cell consists of high-energy phosphates such as adenosine triphosphate (ATP) and phosphocreatine (PC). Free energy is released by enzymatic activation of phosphate from high-energy phosphate bonds. However, the availability of ATP is limited and therefore only replenishes maximum exercise energy for three seconds. This energy store is replenished by the breakdown of carbohydrates through glycolysis or oxidative metabolism of carbohydrates and fats.

Each student represented an element. In this way, the theater proposal served not only to reinforce the content and practical activity, but also helped in the development of very important characteristics of the individual's constitution, such as: socialization (in the production of the theatrical play), communication and disinhibition (in the presentation) and development of critical thinking given the possibility of questioning and evaluating, based on the three presentations, what guides aspects of cellular metabolism and photosynthesis. Each component was made up of one or two students: the sun, plants, carbohydrates, fats, proteins, oxygen, people, carbon dioxide, water, predominantly

aerobic physical activity, predominantly anaerobic physical activity. Also, the muscle, as muscle contraction occurs, actin, myosin, troponin, tropomyosin, ATP, calcium ions were formed. The students explained the moment of muscle contraction during exercise and rest. And in relation to carbohydrates, fats and proteins, which are considered substrates for chemical reactions, such as anaerobic lactic glycolysis, which mainly uses glucose as a substrate, and the aerobic system, it depends on the intensity, duration and conditioning of the person.

As we can see, the theater was a joint construction between teacher and students. The teacher, when writing her narrative, helps students remember the main points discussed in the subject classes, it is also integrated into theater, as another element that facilitates access to knowledge. The students, in turn, respond with the creation and multiple meanings attributed to each element mentioned by the subject teacher.

We return here to the article's epigraph when we mention Freire's phrase (2001, p. 259) "(...) there is no teaching without learning and by this, I mean more than I would say if I said that the act of teaching requires the existence of those who teach and those who learn". For the theater to be successful, the sharing of meanings between teacher and students was essential, that is, the joint construction between them. As the subject of the subject involves new elements for students, traditionally, they would have to memorize all the names, concepts, and elements, in this case this process was not necessary given that the language of theater enabled the production of multiple meanings by combining the tasks assigned. to the students to make the same happen, but also because of the teacher's initiative in placing herself as part of this class activity and not just as a mere spectator.

The teacher, already mastering these contents, created a way of teaching using her knowledge and enabling the other, the students, to experience the art of participating in her narrative and thus construct new knowledge through the production of multiple meanings, provoked by the interaction between students and sharing her knowledge with students.

Rodrigues Júnior and Silva (2008) consider that the production of new meanings occurs through the encounter and confrontation of knowledge – from what students know – the encounter with their knowledge and the confrontation – based on systematized, academic knowledge. In this case, this process occurred during the theater when the students showed what they knew by reenacting the events based on the teacher's narrative and, at the same time, were confronted with new knowledge about bioenergetics.

For Bakhtin (1990), the sign is ideological, that is, the students' form of expression shows that the word expressed verbally and bodily is ideological, has an intentionality and by expressing it they also learn, as they express meanings.

In his other work (BAKHTIN, 1987), the author refers to the context of the Middle Ages and Renaissance when analyzing François Rabelais's novel and thus identifies a series of elements that make up the cultural and social context of the time, such as carnivalization, having the meaning of subversion, of breaking the routine, of allowing the official order of the Church. Thus, carnival in the context of the Middle Ages and Renaissance was a form of renewal for life and the production of meaning. When we approach theater here, we can imagine that the meanings shared by teacher and students through theater are also a form of subversion of order, of the traditional class model in which students pretend to learn and teachers pretend to teach. . Breaking this traditional class model, especially in higher education, in a teacher training course, is essential so that future teachers can learn and then be able to teach, as Freire (2001) tells us.

These results, which involve the construction of a new form of shared class and the introduction of theater, are in line with other didactic initiatives that were inspiration for this work and resulted in the production of meanings and knowledge for student subjects (SILVA et al, 2022, SILVA, FERREIRA, and BONIN, 2022).

At the end of the pedagogical experience, the teacher considered theater as a successful form of evaluation, along with the other formal evaluation instruments that she had included in the teaching plan, such as tests and exercises. In the end, all students passed and expressed that they understood the main elements of the discipline.

4. Conclusion

This work aims to describe and analyze a pedagogical experience in which the language of theater was used in class to enable students to access bioenergetics content, a component of physiology. The construction of the discipline, the theoretical bases and the intentionality of the teacher responsible for making the students learn was fundamental when building a class mode shared with the students, encouraging interaction between them and presenting the concepts and knowledge about bioenergetics, without disregarding the creativity, curiosity and form of expression of students, manifested through theater. Therefore, it is assessed that this is yet another experience that is similar to others that

have been successful in teaching and learning processes in different teaching instances, such as Silva et al (2022) and Silva, Ferreira and Bonin (2022). Other studies are welcome that express new experiences and are based on authors from Education and Linguistics so that we can have, in the near future, increasingly positive rates of learning in different teaching instances, in particular, as was the case in our study context, higher education, in order to review traditional ways of teaching and learning in academia.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

- [1] BAKHTIN, M. Popular culture in the Middle Ages and Renaissance: the context of François Rabelais. São Paulo: Hucitec; Brasília: University of Brasília, 1987.
- [2] (Volochinov). Marxism and philosophy of language: fundamental problems of the sociological method in the science of language. 9. ed. São Paulo: Hucitec, 1990.
- [3] FREIRE, P. Pedagogy of autonomy: knowledge necessary for educational practice. 13ed. Peace and Earth, 1998.
- [4] FREIRE, P. Letter from Paulo Freire to teachers. Estudos Avançados, n.15, v.42, 259-268, 2001. Available at: <<https://doi.org/10.1590/S0103-40142001000200013>>. Accessed on July 13, 2023.
- [5] RODRIGUES Jr., J. C., SILVA, C. L. Meaning in Physical Education classes: encounter and confrontation of different 'suburbs' of knowledge. Pro-Posições (UNICAMP. Printed), v. 19, p. 159-172, 2008.
- [6] SILVA, C. L. da., BEPLER, R. C. R., WICHINHESKI, E., HINERASKE, L. Education for leisure and the environment from a robot toy: dialoguing with Paulo Freire and Mikhail Bakhtin. Dialogue, Canoas, n. 51, p. 01-10, 2023. Available at: <<https://doi.org/10.18316/dialogo.vi51.10518>> Accessed on July 13, 2023.
- [7] SILVA, M. P. da; FERREIRA, H. M.; BONIN, J. C. The contributions of Edu communication to the formation of critical subjects: A dialogue between the theoretical assumptions of Paulo Freire and Mikhail Bakhtin's circle. Iberoamerican Journal of Studies in Education, Araraquara, v. 17, no. 3, p. 1819–1837, 2022. DOI: 10.21723/riaee.v17i3.16599. Available in: Accessed on: 20 April. 2023.