Undergraduate students as promoters of science dissemination: a strategy to increase students’ interest in physiology

Sidnei Borges and Pâmela Billig Mello-Carpes
Physiology Research Group, Federal University of Pampa, Uruguaiana, Rio Grande do Sul, Brazil

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Physiology teaching-learning methods have passed through several changes over the years. This can be seen considering the constancy of publications that bring suggestions for innovations in this area, like papers published in specialized journals such as Advances in Physiology Education. However, considering that the profile of our students is increasingly dynamic and there has been a challenge to propose methodologies to attract their attention, new proposals are still necessary to allow teaching to be effective.

The traditional model of education appears to be linked to the teacher, who resists the use of tools and methods designed to provide something different to the student, depriving the student of new things or even the motivation to realize the applicability of knowledge. There are several ways to provide a class that escapes the traditional teaching model. This can be done through lessons with videos, lectures, seminars, workshops, experimental practices, and use of information and communication technologies, among others. The teachers have to realize what they can use to improve the class and teaching, including an active posture and appropriate teaching tools.

Therefore, it is necessary to have a perception of the physiology professor who escapes the role of a knowledge transmitter and characterizes the physiology professor as someone able to awaken in students a desire to achieve in academic life as a student and later as a professional; this is not a simple task. Physiology is part of health undergraduate courses, and, considering that the population requires health professionals responsible and able to provide quality service, the school and university share responsibility in the formation and performance of these professionals; thus, teachers need to guide students in a way that facilitates the process of building knowledge.

Considering the structure of universities, it is know that it is not always possible or simple to contemplate classes taught satisfactorily with the available tools (2). In this sense, creativity is an important tool (10), especially in education (9). In this article, we report on an experience in the teaching of physiology to health undergraduate courses in a southern Brazil university. We propose the active participation of physiology students in actions for science dissemination during Brain Awareness Week (BAW), which aimed to increase their interest in physiology.

BAW

Currently, several actions that aimed to disseminate science are held worldwide. However, even though these types of action are growing, they are still insufficient to promote adequate popularization of scientific knowledge or are restricted to large centers and/or specific audiences.

One action of science popularization that has been substantially expanded and reaches many continents is BAW. BAW is an annual action that seeks the dissemination of scientific knowledge as well as the progress and benefits of scientific research on the brain and promotes popularization of the areas of science that investigate this organ, such as neurophysiology, neuroanatomy, and neurochemistry.

In 1996, the Dana Alliance organized the first BAW, linking academic, government, professionals, and the general public. In Brazil, the first edition happened at the Federal University of Rio de Janeiro, in 2010, organized by the Science and Cognition Organization, which promoted the dissemination of information about the brain using various different activities and explored the perception of human senses (7). Between the first edition of BAW until 2013, there were events in several cities worldwide. The events promoted the approximation of community to knowledge about the brain.

In the present work, we focused on the BAW 2013 edition, which occurred from March 11–17, 2013. This was the first edition performed in the city of Uruguaiana, Rio Grande do Sul, Brazil, as a proposal from the Physiology Research Group, Federal University of Pampa. The aim was to promote the popularization and dissemination of brain science in Uruguaiana. The difference in our proposal, however, was the idea of including students of undergraduate health programs in the organization and conduction of the actions, making BAW not only an act designed to disseminate science but also an active teaching-learning methodology seeking to increase students’ interest in physiology. This proposal considered that previous studies (3, 4) have shown that students’ active participation improves learning in physiology.

Development of Actions

The actions reported here were organized from February 2013 and held in March 2013 (over 5 wk) along with the development of the physiology course, during the study of neurophysiology topics. The proposal was referred to the Institutional Education Committee for evaluation and was approved (Institutional Review Board no. 10.027.13). It was proposed to students of undergraduate programs of nursing, pharmacy, and physiotherapy that they organize activities for the dissemination of science during BAW 2013. The proposal was that students, in groups, draw up activities involving the contents of neurophysiology studied in class, with the aim of
Illuminations

UNDERGRADUATE STUDENTS AS PROMOTERS OF SCIENCE

Table 1. Organization of BAW actions

<table>
<thead>
<tr>
<th>Phase</th>
<th>Duration</th>
<th>Participants</th>
<th>Objective</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>One meeting in the first week</td>
<td>Professor, physiology undergraduate students, and tutors</td>
<td>Choose a common topic for the activities</td>
<td>Discussions in classroom, after the weekly theoretical class, about the importance of physiology dissemination and what topic of physiology could be proposed to do during BAW</td>
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<tr>
<td>Phase 2</td>
<td>One meeting in the second week</td>
<td>Professor, physiology undergraduate students, and tutors</td>
<td>Think about what activities could be developed and group organization</td>
<td>Discussions in classroom, after the weekly theoretical class, about the audience profile and activities that could be performed during BAW; organization of subgroups in each class to prepare activities within a specific theme of the topic chosen</td>
</tr>
<tr>
<td>Phase 3</td>
<td>Three meetings in the second week</td>
<td>Undergraduate students</td>
<td>Preparation of the activities for BAW</td>
<td>Extraclasse meetings of subgroups to prepare activities in the specific them of the topic chosen</td>
</tr>
<tr>
<td>Phase 4</td>
<td>One meeting in the third week</td>
<td>Professor, physiology undergraduate students, and tutors</td>
<td>Presentation and discussion of the actions prepared</td>
<td>Oral presentation of prepared actions by each subgroup and discussion in the classroom about which could be improved and/or modified</td>
</tr>
<tr>
<td>Phase 5</td>
<td>One day of the BAW (fourth week)</td>
<td>Professor, physiology undergraduate students, and tutors</td>
<td>Realization of actions to disseminate science</td>
<td>Realization of the actions detailed in Table 2</td>
</tr>
<tr>
<td>Phase 6</td>
<td>One meeting in the fifth week</td>
<td>Professor, physiology undergraduate students, and tutors</td>
<td>Evaluation of participation in science dissemination actions during BAW as a way to increase students’ interest in physiology</td>
<td>After BAW actions, we evaluated the efficiency of BAW organization and participation as a way to increase students’ interest in physiology by asking students about it</td>
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</table>

BAW, Brain Awareness Week.

Did you effectively participate in the actions proposed in BAW?
○ Yes
○ No

In your opinion, did the activities proposed in BAW collaborate to awake/increase your interest in physiology?
○ Yes
○ No
○ I did not participate sufficiently in the activities.

Impact of Actions

The two questions stated above were answered by students of nursing, pharmacy, and physiotherapy at the end of the academic semester. Among the students, 86 students were from nursing and physiotherapy undergraduate programs and 38 students from the pharmacy undergraduate program, totaling 124 students [23.70% were male students (age: 23.6 ± 4.7 yr old) and 76.30% were female students (age: 22.2 ± 4.9 yr old)].

About their participation in BAW, 93% of the students (n = 80) of nursing and physiotherapy affirmed that they participated effectively [7% of the students (n = 6) reported that they did not participate sufficiently]. Similarly, 94.7% of the students (n = 36) of pharmacy reported that they participated widely in the proposal [5.3% of the students (n = 2) reported that they did not participated effectively]. It is important to consider that students simply answered yes or no to the question about their engagement with the activities, which did not allow us to qualify their participation in BAW activities. Otherwise, these data are presented to quantify the total number of students who answered the second question.

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Among the students of nursing and physiotherapy who participated effectively in BAW actions, 95% of the students (n = 76) reported that the participation increased or awakened their interest in physiology and 5% of the students (n = 4) said that participation in BAW did not alter their interest in physiology. Among the students of pharmacy, 100% of the students (n = 36) stated that their participation in BAW awakened or increased their interest in physiology. Thus, we realize that the proposed teaching methodology was successful because it allowed students from different health undergraduate programs to simultaneously enter into a moment of interdisciplinary actions, discussions, and exchange of knowledge.

As previously reported (8, 11, 12), students that teach or discuss content with others can learn by teaching other people about some topic; thus, this practice benefits both. Additionally, to improve learning, the use of collaborative strategies permits students to better understand complex content (11) and enhances their academic performance (8). These results can be explained by the fact that students involved in learning tend to retain information for more time that when passive learning methods are used (5). In addition, students learn best when they are focused and thinking about the subject at hand; thus, to teach physiology, we must offer opportunities for students to actively participate in class (4).

Conclusions

Our results demonstrate that the organization and conduction of outreach neurophysiology activities during BAW 2013 can be an effective strategy to awaken and/or increase the interest of health undergraduate students in physiology. Perhaps these actions have aroused in students the scientific curiosity and pleasure of gaining knowledge through an active process through a strategy that is not routinely used in the teaching of physiology. It is evident that similar actions should be well accepted by students, since a new environment or a new methodology makes students escape the monotony and awakes desires and curiosities that are often suppressed by the walls of the classroom.

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DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS

Author contributions: S.B. and P.B.M.-C. conception and design of research; S.B. and P.B.M.-C. performed experiments; S.B. and P.B.M.-C. analyzed data; S.B. and P.B.M.-C. interpreted results of experiments; S.B. and P.B.M.-C. drafted manuscript; S.B. and P.B.M.-C. approved final version of manuscript; P.B.M.-C. edited and revised manuscript.

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*Mouse Party was developed by the University of Utah and is freely available at http://learn.genetics.utah.edu/content/addiction/mouse/.


