Designing an interactive activity to integrate animal physiology in the context of different disciplines

Begoña M. Escribano, Estrella I. Agüera, and Pura Tovar

Department of Cell Biology, Physiology and Immunology, University of Córdoba, Campus of Rabanales, Córdoba, Spain

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Learning is an active process (4). Thus, in an attempt to achieve better results in the learning process, in our teaching project we introduced a complementary activity to other classroom activities (theory and practical sessions). This activity’s design was based on one of the recommendations of the Andalusian Government’s Committee for Innovation in University Teaching (CIDUA) on the basic aspects contemplated in the teaching methodology orientated toward facilitating learning: it is important that “teaching systems use classroom groups and/or new communication technologies for the development of work relationships based on the cooperation of the students, their active participation, and an exchange of opinions on contents, methods, and, especially, on the possibilities of applying their knowledge to the analysis of real problems” (1). The activity proposed revolves around three elements (interactivity, team learning, and peer-to-peer instruction) and consists of the drafting of a “newspaper.” The different characteristics of each of its sections permits the approach to the teaching/learning process, in the context of physiological adaptations, to be more dynamic and attractive to students, who will simultaneously develop a wide range of transversal and specific abilities, which are described in the teaching guide of the subject (2) enabling them to use their knowledge of physiological mechanisms and making possible the multidisciplinary coupling of physiology.

Context of the Activity

This activity was proposed to complete classroom-led activities in the subject “Physiological adaptations to the environment.” This discipline is a compulsory subject in the third year of biology at the University of Córdoba and is taught during the first quarter. At this time, students have already studied the basic subjects of the degree course, which makes it feasible to carry out this multidisciplinary directed activity. The activity was assayed with a class of ∼70 students. The rules for completing the activity were given on the first day of class and recorded in the teaching guide of the subject, which, in turn, is available online in the virtual platform of the University of Córdoba (UCO-Moodle) (2).

Design of the Activity

The newspaper’s contents were established. As this activity was based on team learning, a series of basic contents was proposed, which would be sufficient to ensure the involvement of each and every one of the team members. The newspaper’s contents were as follows.

NAME AND EDITORIAL. A name was given to the newspaper, and an editorial was written. These served to define its contents.

OPINION ARTICLE. This article detailed the opinion of the student on a certain biological theme. The student had to analyze and contrast the various theories published about the theme.

MONOGRAPH. This was written on the basis of one of the topics dealt with in class permitting students to go deeply into the contents and integrate them with those of other disciplines, such as zoology, biochemistry, cell biology, ecology, physics, genetics, etc. For this purpose, the student had to make a bibliographic search (webpages, library), which, at the same time, allowed him/her to practice the use of other languages.

INTERVIEW. The student had the possibility of setting up an interview, either real or bogus, with an expert in current biological themes of general interest to the readers. This contributed to allowing students to work on the style of drafting and logical ordering in the formulation of questions.

GAMES. This section included “crossword,” “soup of letters,” and “finish the sentence” games. These contents encouraged and promoted the acquisition of vocabulary, assimilation of knowledge, and integration of the information received during theory lessons.

Work groups were created. Work groups were formed freely by the students themselves. The number of students in each group varied depending on the number enrolled in the course. In this case, the work was done with 6 groups of 12 students. Each group set up a newspaper and chose its “Editor.” This facilitated communication within the group, the distribution of tasks, and the closing of the edition.

Conducting the activity. The work was done throughout the first quarter (October to January), and its delivery date was fixed for after the Christmas holidays. The newspaper had to be presented in paper and electronic formats, with the latter being placed on the virtual platform of the subject (UCO-Moodle) so that all students in the course had access to the work of all the groups.

Defence of the activity. Two weeks after handing in the work, students from each group had to defend it orally in front of the teacher and the rest of their classmates. After their exposition, students had to answer critiques formulated by their peers. Finally, students had an opportunity to comment on the difficulties found in carrying out the work; they were able to give their opinions on the efficacy of the activity in learning and give their approval for doing this activity in the following academic year.

Evaluation of the activity. Evaluation of the work was the result of a complex process since this activity aimed to develop a wide spectrum of abilities, which are described in the teach-
Table 1. Scoring system for the evaluation of skills acquired with the newspaper teaching activity

<table>
<thead>
<tr>
<th>Skills</th>
<th>Score</th>
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<tbody>
<tr>
<td>At the group level</td>
<td></td>
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<tr>
<td>Cognitive skills (election and treatment of themes included)</td>
<td></td>
</tr>
<tr>
<td>Teamwork (sharing of tasks, number of coordination meetings, and editor’s report)</td>
<td></td>
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<tr>
<td>Analysis and synthesis capacity (consolidation of the news and structure of the news: exposition, development, and conclusion)</td>
<td></td>
</tr>
<tr>
<td>Ethical commitment and sensitivity toward environmental themes (selection of current themes with a social significance)</td>
<td></td>
</tr>
<tr>
<td>Learning to learn (making a newspaper)</td>
<td></td>
</tr>
<tr>
<td>Degree of individual involvement (choice of the theme, development of the theme, and conclusions reached)</td>
<td></td>
</tr>
<tr>
<td>Capacity to write a presentation (drafting of article)</td>
<td></td>
</tr>
<tr>
<td>Capacity to communicate orally (oral exposition)</td>
<td></td>
</tr>
<tr>
<td>Bibliographic search (use of references)</td>
<td></td>
</tr>
<tr>
<td>Practice in other languages (use of bibliography with other languages)</td>
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<tr>
<td>Critique reasoning (assume and answer the constructive critiques formulated by the audience)</td>
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Scores ranged from 1 (minimum score) to 5 (maximum score).

At the individual level

GROUP. Groups had to demonstrate the acquisition of cognitive and transversal skills (teamwork and analysis and synthesis capacity) and the capacity to assume and answer to the constructive critiques formulated by their peers/audience.

INDIVIDUAL. Individuals had to demonstrate their degree of individual involvement, the reason for the choice of the theme developed, the conclusions reached, and the capacity of oral communication.

Learning Gains From the Activity

The development of this interactive activity has prompted us to conclude that, despite the deficiencies carried over from previous educational levels, students possess an excellent potential of abilities, which, with a suitable teaching methodology, they can arrive at developing with efficiency.

The innovative aspect of this activity is that it has introduced a methodological strategy with great plasticity, permitting the subject to be learned by means of various tools. It is clear that the writing of a newspaper in a Journalism degree is quite normal and routine for its students. This is not so with a Biology degree, in which skills are worked on using a more standardized methodology, such as with seminars, presentation of posters, carrying out projects, etc. By drafting a newspaper, students acquire their ability more autonomously. They have not only used knowledge acquired in previous years but were also able to integrate “physiological concepts” in the context of other disciplines, such as zoology, biochemistry, cell biology, ecology, genetics, physics, etc.; they have understood what is meant by an “adaptation” and what triggers it; they have become aware of the benefits of selecting and carrying out their own work and the advantage of working in groups; they have learned to take on responsibilities to meet the deadlines fixed in the planning and execution of a work; and they have understood that leadership is inborn in some individuals but also that it can and should be developed. This interactive teaching/learning system, at the same time, obeys the principle of “learning to learn” and fosters group relationships, thus preparing students for a situation in which they might find themselves in real life.

An assessment of the activity proposed has, therefore, given positive results inasmuch as it has served to effectively develop the potential abilities of students. It stimulates autonomous learning and increases students’ motivation to learn as they discover their own capacity and understand that the knowledge acquired in the discipline is part of a much wider context. However, when evaluating the activity, the students themselves manifested a negative element: mainly the excessive workload, as they had to combine the writing of the newspaper with activities in other subjects. This led us to consider the possibility of establishing, with teachers of other subjects, a learning module in which this interactive activity would be included and would thus be of a cross-disciplinary nature, because the content in physiology overlaps with that of many disciplines (3, 5) and the boundaries between them are highly flexible.

DISCLOSURES

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

REFERENCES