

## Virtual Physiology Laboratory for Biological Science Blended Teaching

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### Abstract

Experimental education is key to student-centered learning. Practical work, particularly investigations that involve problem-solving, enable a better understanding of the scientific processes and the nature of science, and even knowledge creation. It is thus desirable a paradigm shift to project-based teaching and research-based learning in the initial and permanent formation of biological science teachers. Hands-on training also allows both students and teachers to gain experience with required hardware and software. These processes may be impaired in distance education implemented in teachers' blended teaching -a format with a long tradition in the Uruguayan Public Education System-. This was also revealed worldwide by the impact of the suspension of classes at all educational levels due to the COVID-19 pandemic. To get around these limitations we created a living real and virtual Biological Science Laboratory, an eLearning environment within which Physiology and Cell Biology research-based learning may be implemented. Two interactive virtual laboratories were created with Unity software. One for invertebrate action potential recordings and another for Hill's reaction, enabling the control of various variables as required for virtual laboratory work, including conducting experiments and obtaining results without the need for laboratory hardware. The virtual laboratory based on real experimental setups is now being tested by Uruguayan science teachers to reveal its suitability as an alternative solution to face-to-face activities. As a result of the implementation of this educational innovation, we also expect to contribute to improving the critical thinking skills of novel and experienced Biological Science teachers that may impact on their professional activity.

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