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Analysis of the vertebrate circulatory system's anatomy

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Abstract

The student must be a proactive protagonist in the development of his knowledge via the employment of techniques that are as similar as feasible to the research procedures of scientific discoveries. This is now acknowledged and, in fact, demanded by the literature. In schools, scientific content is frequently taught by the teacher in the form of a lecture, and as students sit through this passive participation, they gradually lose interest in the subject matter, even though they had initially shown a lot of enthusiasm for it, without ever internalising any valuable information for their lifelong learning. The transmission approach, which imparts superficial knowledge and does not foster metacognition, must be abandoned in favour of the laboratory method, which is based on the scientific method, in order to rekindle interest in the subject and motivation for the study of science in both teachers and students. In light of this, my study, which set out to test two experimental hypotheses, has been successful. Comparing the use of more conventional modalities, such as frontal lectures or group projects based on texts, to the validity of a laboratory approach and the use of the scientific method in the teaching of biology is the first hypothesis. The second hypothesis examines whether it is feasible and efficient to include elements that are often not covered in elementary school, such as comparative anatomy and histology, into the subject of choice, the circulatory system in vertebrates and invertebrates (with the use of the optical microscope). The study involved two fourth-graders from a primary school in northern Italy; one was used as an experimental group through the use of the laboratory method, with the observation of various biological materials and histological preparations of the circulatory system, belonging to different species, and the other as a control group. The findings demonstrated that the laboratory technique may be used successfully in primary schools to teach subjects like comparative anatomy and histology. This approach really fosters a sense of participation and involvement in the children's learning, which is crucial for boosting motivation and, in turn, passion and interest in the subject.

Keywords: circulatory system, comparative anatomy, histology.

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Introduction

The primary goal of this research was to compare the use of more conventional teaching techniques, such as the frontal lesson or group work based solely on the use of written texts, with the validity of a laboratory approach and the application of the scientific method in the teaching of scientific disciplines, and specifically, of biology. The school where I conducted the study seldom uses the laboratory teaching method. The second goal of the study was to examine the feasibility and efficacy of including histology and comparative anatomy of vertebrates into the study of a subject like the circulatory system, which are often not covered in basic education. A learning unit was developed with the laboratory method as its fundamental methodology, applied using the observational-comparative method: various biological materials were presented to children to be observed with the unaided eye or using an optical microscope in order to verify the hypotheses described (both macroscopic and microscopic observation). Additionally, methodological experimental hypotheses were advanced: two fourth grade classes needed to be used for the experiment, with the same planned material being taught using various approaches. The experimental group used a workshop approach while using the scientific method, while the control group employed a more conventional didactic approach while using textbooks, photos, and videos.

Nervous Tissue in Vertebrates

Ectodermal tissue makes up the nervous system. The neural or medullary plate, which thickens along the mid-dorsal side of the gastrula in vertebrates during embryonic development and gives birth to the neural tube and neural crest. Some neural crest cells migrate out from the neural tube to provide hse to the bodies of neurons that sit outside the brain and spinal cord. The neural tube is the precursor of the brain and spinal cord. You would remember the typical neuron's structure from earlier courses, LSE-05 and LSE-09, which consists of a cell body, several processes that emerge from it, including the dendrites, which are typically numerous and highly branched, and the single long process, the axon with branches, and the terminal arborization at its end. The axon may produce collateral branches, although often none do. Neurotransmitters are produced at the axon terminals that convey the information in the form of impulses across the synapse to the other

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neuron when the axon terminal makes intimate contact (synapse) with the dendrites of another neuron. Typically, this is one-way. Thousands of additional neurons that communicate through their axons and receive information via their dendrites may come into touch with a single neuron.

Although neurons are the fundamental building blocks of the nervous system, additional tissues called neuroglia (nerve glue) are dotted throughout the nervous system and provide support and some degree of protection. Neither do they send impulses or release neurotransmitters. 1) Ectddermal-derived macroglia are one of the two main forms of neuroglia.

2) Mesodermal-derived microglia. Sensory Organs and the Nervous System Oligodendrite cells are one kind of macroglia. These increase the axon-wrapping processes. Myelin, which is a material abundant in proteins and lipids, makes up this covering or sheath. Only vertebrates have myelin sheaths in their axons in general. Ribbon-like cells also cover the axons of neurons that are not located in the brain or spinal cord. These are Schwann cells, which resemble oligodendrites in that they both generate myelin, an insulating substance that, like the covering on an electric wire, stops the nerve impulse from losing energy as it travels up the axon. Since myelin fibres with thick coverings transmit at the fastest speeds, the presence of myelin sheath also aids in the quick conduction of nerve impulses. The nodes of Ranvier are circular constrictions that puncture this myelin sheath at regular intervals. Cyclosomes lack the myelin sheaths seen in vertebrates. The biggest and most prevalent kinds of microglial cells are astrocytes, which are another type. They interact with other nerve tissue and keep the physiology of those tissues normal. Additionally, they assist in maintaining the blood-brain barrier as well as brain growth, restoration, and healing. A ganglion is a grouping of nerve cell bodies. The grey matter is made up of clusters of nerve cell bodies, their dendrites, and the proximal unmyelinated section of axons. The main component of the brain and spinal cord is grey matter. White matter, on the other hand, is made up of bundles of myelinated fibres. In the brain, spinal cord, and the rest of the body, these bundles are referred to as nerve tracts. Sometimes the white and grey matter coexists. Reticulated formation is the name given to such a configuration. There are two primary divisions in the vertebrate nervous system.

- The brain and spinal cord, which make up the central nervous system (CNS).

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- The peripheral nervous system (PNS), which is made up of the spinal cord's nerves and ganglia as well as the brain's cranial nerves. Autonomic nerves, which are transmitted to the body parts under involuntary control, make up a portion of the peripheral nervous system.

Conclusion

Numerous studies conducted in the global and European contexts looked at the most crucial strategies for improving learning. It was found that these methods are not used by the Italian school. The workshop method requires careful planning and execution, but it produces superior results and engages, motivates, and inspires students. Additionally, it fosters in teachers a newfound enthusiasm for the topic. Additionally, the introduction of topics like comparative anatomy and histology in primary school may aid children in understanding issues in science that seem to be difficult and dull as well as how fascinating biology is.

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