

Research on Student Learning

Research has focused on what students understand about the living environment at isolated points in time or on how this understanding evolves naturally in students. Research on instructional interventions that improve students' understanding is limited. [1]

Some research indicates that in 2nd grade there is a shift in children's understanding of organisms from representations based on perceptual and behavioral features to representations in which central principles of biological theory are most important. Children at this age can begin to understand that animals of the same species have similar internal parts and offspring. [2] When asked to group certain organisms, lower elementary-school students form groups of different status -- for example, organisms that are able to fly and organisms that fight each other. Upper elementary-school students tend to use a number of mutually exclusive groups rather than a hierarchy of groups. Some groups are based on observable features; others on concepts. By middle school, students can group organisms hierarchically when asked to do so, whereas high-school students use hierarchical taxonomies without prompting. [3]

Elementary- and middle-school students hold a much more restricted meaning than biologists for the word "animal". [4] For example, most students list only vertebrates as animals. Elementary- and middle-school students use such criteria as number of legs, body covering, and habitat to decide whether things are animals. High-school students frequently use attributes that are common to both plants and animals (e.g., reproduction and respiration) as criteria. [5] Because upper elementary-school students tend not to use hierarchical classification, they may have difficulty understanding that an organism can be classified as both a bird and an animal. [6] Elementary- and middle-school students also hold a much more restricted meaning than biologists do for the word "plant". Students often do not recognize that trees, vegetables, and grass are all plants. [7] Elementary- and middle-school students typically use criteria such as "movement," "breath," "reproduction," and "death" to decide whether things are alive. Thus, some believe fire, clouds, and the sun are alive, but others think plants and certain animals are nonliving. [8] High-school and college students also mainly use obvious criteria (e.g., "movement," "growth") to distinguish between "living" and "nonliving" and rarely mention structural criteria ("cells") or biochemical characteristics ("DNA"). [9]

References

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