

## The Living Environment > DNA and Inherited Characteristics

### Research on Student Learning

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. [1] By the end of 2nd grade, students know that children resemble their parents and realize that reproduction underlies this resemblance. Students at this age can also begin to understand the difference between learned resemblance and inherited resemblance. [2]

When asked to explain how physical traits are passed from parents to offspring, elementary-school, middle-school, and some high-school students express the following misconceptions: Some students believe that traits are inherited from only one of the parents (for example, the traits are inherited from the mother, because she gives birth or has most contact as children grow up; or the same-sex parent will be the determiner). Other students believe that certain characteristics are always inherited from the mother and others come from the father. Some students believe in a "blending of characteristics." It may not be until the end of 5th grade that some students can use arguments based on chance to predict the outcome of inherited characteristics of offspring from observing those characteristics in the parents. [3]

Early middle-school students explain inheritance only in observable features, but upper middle-school and high-school students have some understanding that characteristics are determined by a particular genetic entity which carries information translatable by the cell. Students of all ages believe that some environmentally produced characteristics can be inherited, especially over several generations. [4]

By the end of 5th grade, students know that babies result from the fusion of sperm and eggs. However, they often don't understand how the fusion brings new life. Before students have an early understanding of genetics, they may believe that the baby exists in the sperm but requires the egg for food and protection, or that the baby exists in the egg and requires the sperm as trigger to growth. [5]

### References

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[3] Deadman, J., Kelly, P. (1978). What do secondary school boys understand about evolution and heredity before they are taught the topics?. *Journal of Biological Education*, 12, 7-15.

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[5] Bernstein, A.C., Cowan, P.A. (1975). Children's concepts of how people get babies. *Child Development*, 46, 77-91.

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