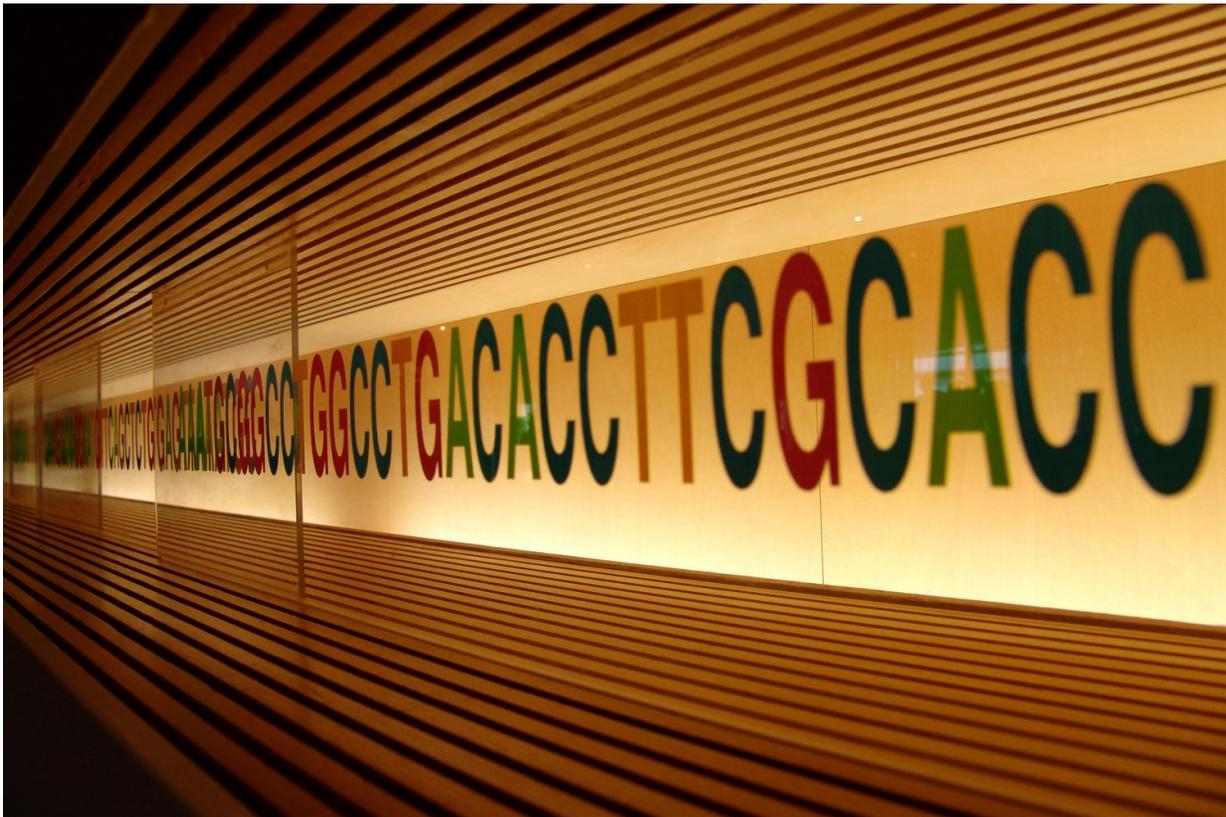


Improve evolution education by teaching genetics first

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Children taught genetics first increase their understanding of evolution. Credit: Miki Yoshihito, Flickr

Evolution is a difficult concept for many students at all levels, however, a study publishing on May 23 in the open access journal *PLOS Biology*

has demonstrated a simple cost-free way to significantly improve students' understanding of evolution at the secondary level: teach genetics before you teach them evolution.

Currently in the UK setting the two modules are taught in isolation often with long time intervals between. The team, led by Professor Laurence Hurst at the Milner Centre for Evolution, University of Bath hypothesised that since core concepts of genetics (such as DNA and mutation) are so intimately linked to the core concepts of evolution, then priming students with genetics information might help their understanding of evolution.

The researchers conducted a large controlled trial of almost 2000 students aged 14-16 in 78 classes from 23 schools across the south and south west of the UK, in which teachers were asked to teach genetics before evolution or evolution before genetics.

The students were tested prior to teaching and after. The five year study, found that those taught genetics first improved their test scores by an average of seven per cent more than those taught evolution first.

Teaching genetics before evolution was particularly crucial for students in foundation classes, who increased their understanding of evolution only if they were taught genetics first. The higher ability classes saw an increase in evolution understanding with both orders, but it was greatest if genetics was taught first.

The team also tested the students' understanding of genetics and found that the genetics-first effect either increased genetics understanding as well or made no difference, meaning that teaching genetics first doesn't harm students' appreciation of this subject.

Professor Hurst, commented: "These are very exciting results. School

teachers are under enormous pressure to do the best for their students but have little time to make changes and understandably dislike constant disruption to the curriculum."

"To be sensitive to their needs, in the trial we let teachers teach what they normally teach - we just looked at the order effect."

First author on the paper Dr Rebecca Mead, a former [teacher](#) herself, said: "It's remarkable that such a simple and cost-free intervention makes such a big difference. That genetics-first was the only intervention that worked for the foundation classes is especially important as these classes are often challenging to teach. This research has encouraged teachers to rethink how they teach evolution and genetics and many schools have now changed their teaching practice to genetics-first. I hope more will follow."

The team also looked at whether students in the study agreed or disagreed with the scientific view of evolution. They found that whilst the teaching of evolution increased acceptance rates to over 80 per cent in the cohort examined, the order of [teaching](#) had no effect.

Qualitative focus group follow-up studies showed that acceptance is heavily conditioned by authority figures (teachers, TV personalities, religious figures) and the correlation between the students' understanding of evolution and their acceptance of it is weak.

Dr. Mead commented: "Some students reported that being told that key authority figures approve of the scientific evidence for [evolution](#) made a big difference to their learning experience. It would be worth testing alternative ways to help students overcome preconceptions."

More information: Mead R, Hejmadi M, Hurst LD (2017) Teaching genetics prior to teaching evolution improves evolution understanding

but not acceptance. *PLoS Biol* 15(5): e2002255.
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