

Challenge of Teaching Genetics at Early Stage

Edwards Willey, Fuzhou Wang

Group of Neuropharmacology and Neurophysiology, Division of Neuroscience, The BASE, Chapel Hill, NC 27510, USA

“I cannot teach anybody anything. I can only make them think.”

– Socrates

AS a part of early science education, biogenetics is one of the critical components. Usually, the course is taught at the middle school at the earliest (Committee on the Science of Children Birth to Age 8, 2015). There may be specific difficulties for adolescent students who are first exposed to genetics knowledge, from cognition to knowledge reserve. In addition, understanding its basic concepts may require the lecturer to adopt certain methods and skills (Hirsh et al., 2020). Due to the abstract nature of genetics, this is more challenging for students of this age.

As far as genetics teaching is concerned, it is challenging for higher professional academic education (such as medical students and dental students, etc.) (Shirani Bidabadi et al., 2016). Of course, this is especially true for middle and high school students. Kılıç Mocan (2021) observed the understanding of basic genetics knowledge of high school students in his school through an interview. It turned out that many students are unfamiliar with its concepts and fail to clarify the relationship between the basic concepts, causing mutual confusion. This result is understandable. This is true among beginners and happens in the early stages of learning among professional students (Dudliceck et al., 2004; Monsen, 1999; Telner et al., 2008).

Human cognition of things is a gradual process (Sanders, 2013). Age is one of the crucial factors affecting cognition (National Research Council (US) Panel to Review the Status of Basic Research on School-Age Children, 1984). We cannot overcome the influence of age on the perception of things. However, under the same conditions and background, the methods of acquiring knowledge can be very different, and their results will also vary greatly. Of course, this difference in learning efficiency due to methodological differences is exceptionally related to the person's knowledge level, the teaching methods they use, and the teaching conditions their institution provides (Değirmencioğlu, 2021; Jungert & Rosander, 2010; Sharp et al., 2016). For

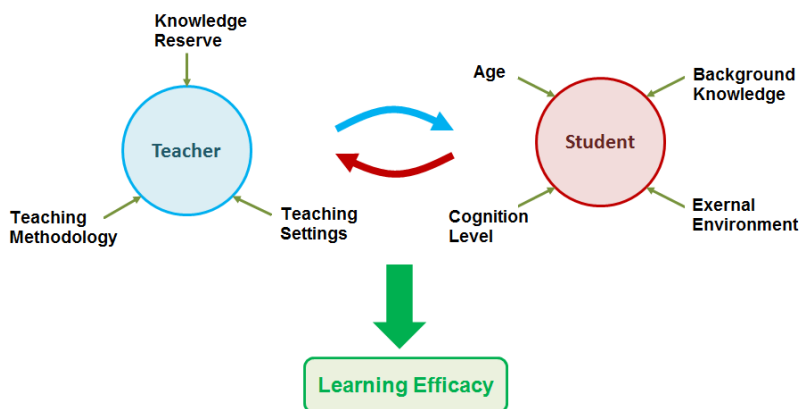


Figure 1. Teacher-Student Interactive Relationship.

example, suppose a highly knowledgeable teacher has a blunt and uninspired teaching method and only instills knowledge points into the students or lets them memorize by rote. In that case, one can imagine how their teaching effect will be.

In the same way, a teacher may lack some knowledge reserves, but his teaching methods can arouse students' sympathy and interest. This undoubtedly enables students to grasp the concepts and relationships among their learned points quickly. Therefore, regardless of the subject, students' cognition and mastery of knowledge result from a number of factors that comprehensively function. Of course, the teaching of genetics is with no exception. Teaching is ultimately a comprehensive result of the software and hardware interaction of various aspects such as students, teachers, and the environment (**Figure 1**).

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Correspondence to:

Edwards Willey, Ph.D.

E-mail: edwards.willey@basehq.org

Or

Fuzhou Wang, M.D., Ph.D.

E-mail: fred.wang@basehq.org

Group of Neuropharmacology and Neurophysiology

Division of Neuroscience

The BASE

Chapel Hill

NC 27510

USA

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