

“Learning should build on children's existing knowledge and experiences”

Interview by [Eveline von Arx](#)
March 23, 2018

Nearly every class includes some students who are unable to keep up with classroom instruction. They have “turned off.” But that doesn’t have to be the case. Neuroscientist Gerhard Roth discusses what makes for successful teaching and learning.

Eveline von Arx: *You once pointed out that it’s often better to teach less rather than more subject matter, but to go into greater depth.*

Gerhard Roth: Yes. It’s not about giving students as much information as possible, but instead ensuring that they retain that information.

In the process of learning and understanding, our working memory absorbs the relevant content and tries to construct its meaning. If information makes no sense to us, it will not be stored in our long-term memory after it passes through our intermediate-term memory. The things that don’t make it through the filter of our working memory will not find their way into our long-term memory.

Moreover, there is a limit to the speed with which we are able to make sense of what we hear. We can absorb a maximum of approximately four words per second. If the teacher speaks at that rate, and if students are familiar with the words and have some sense of their meaning, then given normal ability, they will be able to keep up. The same holds for reading a text.

EvA: *How is meaning constructed in our brains?*

GR: Let’s stay with the topic of how we absorb what we hear: It is much more difficult to understand words than you might think. First of all, the physically continuous sounds need to be broken down into segments: words. Within about 200 milliseconds, all of the information we hear or read is linked to meanings that we have stored in our brains, and those meanings are then loaded into our working memory. If this process cannot be completed, students will not be able to absorb the material. They “turn off” because what the teacher is saying makes no sense to them.

EvA: *What else is important for the process of understanding?*

GR: The students’ existing knowledge and a connection to their life experiences. It is very important to know about those things before new material is introduced. When teachers are trying to cover as much material as possible, however, there is generally no time to explore those questions. To give you an example: It doesn’t make sense to teach the Pythagorean theorem if students have not yet learned to solve quadratic equations.

When introducing the Pythagorean theorem, the teacher might talk with students about where and when Pythagoras lived. They might be told that Pythagoras lived in Asia Minor and that he was an important philosopher in ancient times and the founder of a religious and philosophical movement

that viewed God as a mathematician. Students tend to remember such stories, and then they are also more likely to remember the Pythagorean theorem.

“Successful learning requires a competent teacher who is able to build a positive relationship with students.”

Unfortunately, much of what children learn in school today has little to do with their lives, and there is often a lack of an emotional connection. Take foreign languages, for example: Many students study French for years, but by the time they graduate from secondary school they are hardly able to speak the language because no connection has been made to their everyday lives.

EvA: *What else can be done to keep students from forgetting what they have learned?*

GR: Let's look at how students read and understand a text. It's not a good idea to read the text over and over again; that takes too much time and doesn't achieve the desired results. They should take an efficient approach instead, first skimming through it so that they know roughly what it's about. Reading it again, they should take a marker and highlight the main ideas, ranking them according to whether they are the most important, second most important or third most important. Then they should read just the highlighted passages, perhaps several times, and memorize that material.

Even young children can be taught these skills.

EvA: *Why is it so essential to review the material you have learned?*

GR: The main goal of learning is to have a solid grasp of the material and to be able to access it efficiently. To achieve that goal, you have to reproduce it on a regular basis. This means actively reviewing it several times – retrieving or remembering the information you have learned. This makes it easier and easier to remember what is stored in your memory. Otherwise you will forget the information you have learned because it has disappeared into the depths of your memory.

EvA: *You have pointed out that a teacher's personality plays an important role in a student's learning.*

GR: The more charismatic, sensitive and above all trustworthy a teacher is, the better children will learn. Successful learning requires a competent teacher who is able to build a positive relationship with students. “Visible Learning,” the well-known meta-study [by John Hattie](#), found that the [relationship between teacher and student](#) has a profound influence on children's learning.

Teachers who encourage their students and try to bring out the best in them promote self-efficacy. I therefore believe that it is very important for prospective teachers to know something about psychology, as this will help them motivate their students.

Gerhard Roth is a professor of behavioral physiology and developmental neurobiology at the Brain Research Institute and [Center for Cognitive Sciences at the University of Bremen](#), Germany.

This article was published on BOLD, the Blog on Learning and Development. If you would like to share it with others, please do not use this PDF but instead link to the original post at <https://bold.expert/learning-should-build-on-childrens-existing-knowledge-and-experiences/>.