Student Misconceptions in the Psychology Classroom

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The greatest challenge facing psychology teachers may not be teaching students new information, but teaching them that what they already believe to be true about psychology is often wrong. In class, students bring with them a wide array of misconceptions and misunderstandings that many, if not most, teachers assume to be benign or easily corrected through sage instruction. Psychologists ought to know better. These misconceptions are not benign: They affect students' ability to learn and understand new information, and these beliefs can be remarkably resistant to change.

Consider the extramission theory of vision, the mistaken belief that people see by emitting rays from their eyes that reflect off objects. This seems like a relatively simple misconception that should be easily corrected by reading the sensation chapter of any introductory psychology textbook. Winer, Cottrell, Gregg, Fournier, and Bica (2002) summarized a series of studies that found this belief to be fairly common and hard to correct. To the naïve layperson, the idea that we see by emitting rays seems intuitively logical and is reinforced through popular images (e.g., Superman's x-ray vision). Depending on how one tests for it, more than one-half the population may hold some version of this belief. Moreover, after reviewing a number of studies that tried to correct extramission beliefs, Winer et al. "found no evidence that traditional readings presented immediately before the test, formal classroom experiences, or the combination of both improved performance" (p. 421). They did find, however, that when college students were shown a highly simplified lecture on vision containing explicit refutational statements about extramission beliefs, there was a reduction in those beliefs. The improvement, though, was temporary and disappeared after 5 months. Thus, it may be that students leave our psychology courses with their misconceptions intact. Indeed, they may actually feel more confident in their mistaken beliefs because they have taken a psychology course (Landau & Bavaria, 2003)!

Where do these misconceptions come from and why are they so resistant to correction? Misconceptions come from a variety of sources. The popular media promulgate many. Examples include the beliefs that being hit on the head causes complete retrograde amnesia, that subliminal messages are powerfully persuasive, and that we only use 10% of our brain or only the left hemisphere of our brain (or 10% of the left hemisphere). Other misconceptions may be "rules of thumb" built up through subjective experience and strengthened by confirmation bias. For example, most people believe they are "good listeners." Stereotyped and prejudicial beliefs about certain groups of people also fall into this category.

Other misconceptions—that blind people develop greater sensitivity in other senses, that babies and parents develop attachment at birth, and that actions must flow from attitudes—develop because they seem intuitively logical, fair, or just. Some simplistic misconceptions take hold because they are easier to grasp than more complicated, confusable, or counterintuitive truths. Examples include students' difficulty distinguishing negative

reinforcement from punishment, learning that genetics and environment interact and are not additive, and understanding that negative correlations can be as strong as positive ones.

Finally, some misconceptions are developed and entrenched because they are part of a person's self-image. When I teach about Milgram's obedience studies, many of my students are aghast that 65% of subjects would administer the highest level of shock, yet few of my students are willing to believe they might be among that 65% if they were put in that situation.

I have listed only a few, but many common misconceptions have been documented (cf. Landau & Bavaria, 2003). They range from global ideas—that psychology is about getting in touch with one's feelings or is just common sense—to the highly specific—mind and body are separate and one can choose to ignore one's brain. Such misconceptions are not unique to psychology. They have also been studied extensively in physics and biology (Gardner, 1991). The problem is that such beliefs are even more pervasive in psychology, and this presents special teaching challenges.

The fact that students have misconceptions would be irrelevant if such beliefs had no impact on further learning. A large body of literature on schema and learning, however, indicates this is not the case. One's schema, or belief system, can have a major impact on what is noticed, what is learned, what is forgotten, and how memories may become distorted (e.g., Bower, Black & Turner, 1979; Bransford, & Johnson, 1972).

If these misconceptions are prevalent and if they influence learning, why are they not a more central issue in teaching? Many teachers fail to address these misconceptions because they believe the primary focus of teaching is presenting information accurately and clearly. What the students bring to and take away from their teaching is not the teacher's responsibility. It is only when a teacher shifts the primary focus away from what is taught to what students are actually learning that these misconceptions become a major concern.

The next question, then, is how to correct the tenacious misconceptions that affect whether and what students learn. This question addresses the fundamental issue of how systems of belief are changed or refined through experience. Piaget called this accommodation, and although he distinguished it from assimilation, he never specified under what conditions accommodation occurs and under what conditions assimilation occurs. Likewise, there is relatively little research in schema theory about when and how schemata are refined through interaction with the environment. One exception is the work of Vosniadou and Brewer (1992), who studied how children move from the intuitive belief that the earth is flat to the correct belief that the earth is a sphere. They found that internalizing the correct belief takes many years and involves many incorrect transitional beliefs. This finding underlines the challenge of changing misconceptions.

Winer et al. (2002) suggested a process they call "activation" to counter misconceptions. Activation involves alerting students to misconceptions before presenting the relevant, accurate information. One method of achieving activation is through the use of examples that are engaging, relevant, and make clear the shortcomings of a misconception. Although

virtually all teachers use examples, relatively few actually select or design examples explicitly to meet these criteria (e.g., Ward & Sweller, 1990). Even when they do, however, using examples effectively is not straightforward (e.g., Lee & Hutchison, 1998).

Another method I have used with some success is the ConcepTest, which Mazur (1997) developed to teach physics. ConcepTests are an engaging and interesting way to make both teacher and students aware of the limits of student understanding. They are easy to develop and use, and can be used in classes of any size. I have described their development and use in the Winter 2004 issue of the Psychology Teachers Network newsletter (Chew, 2004). Because the newsletter is available online at the Teachers of Psychology in Secondary Schools (TOPSS) homepage on the American Psychological Association website <http://www.apa.org/ed/topss/homepage.html>, I will not go into great detail here.

Essentially, a ConcepTest is a good multiple choice question that has a common misconception as a lure. Here is one I use for correlations:

> A marriage counselor studies four different tests designed to predict marital happiness to see which one is best. She administers the four tests to 80 couples who are about to get married. After two years, she measures the marital happiness of the couples and correlates it with each of the four tests with the following results:
>
> Test 1: r = -.73 Test 2: r = .62
> Test 3: r = .25 Test 4: r = .10
>
> If the therapist wanted to pick the single best test to use in her work, which one should she choose and why?

The correct answer is Test 1: r = -.73 because it is the strongest correlation. Many students, however, have the misconception that positive correlations are better than negative ones, so they pick Test 2. The key to using ConcepTests is following the procedure outlined below. For example, after lecturing on correlations:

1. I present the ConcepTest to the class and give them time to think about which answer they believe is correct. This takes about 3 min.
2. On my signal, all students publicly indicate their answers by raising their hands with the number of fingers of their chosen alternative.
3. I have students pick a classmate, preferably one with a different answer, to discuss their choices, which takes about 2-3 min
4. I repeat Step 2 to see how choices have changed, and if there is a consensus.

5. Finally, I have students explain their choices and discuss the correct answer as a class, which typically takes 2 min or more.

Notice how all students must publicly commit to an answer, defend the answer to a peer, and then commit again. Their misconception, or correct understanding, is activated, and then they learn the correct answer and reasoning behind it. Thus, activation is achieved.

In my introductory psychology courses, I have tested the effectiveness of ConcepTests in correcting misconceptions about correlations. My research has found that they do lead to significant increases in learning at both the factual and conceptual levels of understanding. Although ConcepTests do lead to significant improvement in understanding, student performance is far from perfect, indicating the difficulty of overcoming certain misconceptions.

In conclusion, I have tried to describe how students often possess misconceptions about psychology and how difficult they can be to correct. These misconceptions have a major impact on what students do and do not learn in a course. Many teachers choose to ignore their presence and impact, acting as if they are benign or irrelevant to teaching. Unfortunately, this in itself is a dangerous misconception.

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