Reducing Students’ Misconceptions With Refutational Teaching: For Long-Term Retention, Comprehension Matters

Patricia Kowalski and Annette Kujawski Taylor
University of San Diego

The purpose of this study was to determine whether the use of refutational teaching for reducing student misconceptions produces longer lasting change when compared with standard teaching methods. Continuing previously reported findings over the short term, we followed students through 2 years of undergraduate education. A sample of primarily first-year students (N = 111) enrolled in introductory psychology completed a pretest and a posttest of misconceptions at the beginning and end of the semester. We taught the introductory psychology course addressing misconceptions using refutational text and lecture (a misconception is activated, then refuted with evidence), standard teaching (provided evidence-based information without activation of the misconception), or did not address the concept (control condition). Students again completed the posttest at the end of the semester following the course and again at the end of the third semester following the course. Sixty-eight students completed all measures. On average, students recognized more correct concepts at the end of the course, particularly when taught in a refutational manner. Students retained correct concepts beyond the course, significantly more so when taught refutationally. Students demonstrating higher verbal comprehension (SAT Critical Reading) acquired and retained more correct concepts. When tested at the end of the third semester following completion of the course, however, even items taught in a refutational manner declined significantly. This decline was particularly true for students demonstrating lower verbal comprehension. These results support other studies that find small but significant long-term benefits to refutational teaching for changing prior misconceptions.

Keywords: misconceptions, refutational teaching, belief change, comprehension

From a fear of vaccinations to a denial of global warming, one does not have to look far to see gaps in the general public’s understanding of important concepts. A recent survey by the American Association for the Advancement of Science (AAAS) (“Major Gaps Between the Public,” 2015) found high levels of disagreement between members of its scientific community and US adults. For example, 98% of AAAS members agreed that humans have evolved over time, but only 65% of US adults agreed with this statement. Among college-educated adults, agreement that humans have evolved over time rises to 75%, reflecting only a slight improvement. Even when college students study specific content in courses, the courses often do little to decrease their misinformation. This is true for biology (Alparslan, Tekkaya, & Geban, 2003), chemistry (Zoller, 1990), physics (Kim & Pak, 2002), as well as for psychology (Hughes, Lyddy, & Lambe, 2013; Kowalski & Taylor, 2009; Vaughan, 1977). Misconceptions are certainly pervasive and correcting them is difficult, even in our college courses.

To address the tenacity of misconceptions, we investigated the role of refutational teaching (Taylor & Kowalski, 2012). Based on models of conceptual change in the science and reading education literatures (Posner, Strike, Hewson, & Gertzog, 1982; Strike & Posner, 1992) refutational teaching requires instructors address or activate misconceptions in ways that create conflict or dissatisfaction. By providing intelligible and plausible alternatives and evidence that can provide a framework for making predictions,
this type of instruction refutes the misconception and replaces it with the scientific alternative. Research confirms the value of refutational text as a means of reducing misconceptions and producing conceptual change (Lassonde, Kendeou, & O’Brien, 2016; Sinatra & Broughton, 2010).

Despite evidence that refutational teaching can reduce students’ misconceptions in the short term, it is unclear whether these changes endure over time. Several lines of research indicate that students’ understanding of correct concepts deteriorates over time (Lassonde et al., 2016; Lyddy & Hughes, 2012; Mason, Gava, & Boldrin, 2008). In our experience, even after teaching in a refutational manner in lower division courses, we find misconceptions to be prevalent among these same students when they take our upper-division courses. However, we had not systematically tracked students from our introductory courses.

Few studies in psychology have addressed whether students retain correct conceptions over time. Research reporting cross-sectional comparisons suggest that graduate students hold fewer misconceptions compared with upper division undergraduates, who in turn hold fewer misconceptions than entering student (Hughes et al., 2015). Although informative, these cross-sectional comparisons do not rule out alternative explanations related to individual differences. For example, upper level students may hold fewer misconceptions because they are better able to comprehend and analyze scientific literature compared with lower level students (Marsh, Guenther, & Raimondi, 2015). Answering questions regarding the durability of our refutational teaching requires following the same students over time.

Two recent studies provide some preliminary longitudinal data to address the question of durability among psychology students’ conceptions over time. A recent study by Lassonde et al. (2016) found that after reading refutational text, a reduction in misconceptions remained among students at a 1-week delayed testing. McCarthy and Frantz (2016) found that students corrected most of 12 misconceptions following a psychology course, then maintained the correct information for over a year. The researchers tested students on misconceptions at pre- and postcourse. At postcourse, researchers told the students that all claims were false. At the year follow-up, researchers again tested students on the 12 misconceptions. Students correctly reported the misconceptions were “false” or “mostly false,” suggesting that students were able to remember that claims were in fact false. There was no assessment, however, of whether students could differentiate true from false claims or whether student responses were the result of demand compliance (Hughes et al., 2015). Although the researchers did not specifically refute misconceptions in class, they used a critical thinking approach for some misconceptions more than others, and some changed more than did others. The study did not address the question of whether refutation is critical to long-term revision of these student misconceptions.

Although refutational teaching may contribute to enduring change in students’ correct conceptions, conceptual change models suggest student characteristics contributing to the likelihood of such change. Lasting change requires deep processing of information, as individuals activate old and new information and integrate the old with the new conceptions (Kendeou & O’Brien, 2014). Drawing parallels with the dual process theory of persuasive communication (Petty & Cacioppo, 1986), Dole and Sinatra (1998) suggested that rather than engage in more effortful strategies for conceptual change, some students may process the new information only peripherally, less effortfully, and thus achieve only weak levels of change. Weak change may permit students to demonstrate temporary retention within the context of classroom pressures, but when pressures decline, students whose change was only superficial may revert to their original conceptions. Change, that endures over time may be more likely for those students who engage in processing new information.

In our work on misconceptions in psychology, we have found that regardless of GPA and critical thinking ability, students do not differ in their level of misconceptions when they enter the class (Kowalski & Taylor, 2011). The higher ability students, however, are more likely to change their misconception by the end of a course (Gutman, 1979; Kowalski & Taylor, 2011). Although these findings suggest greater change for students demonstrating higher levels of general ability, we have not yet investigated differences in students’ comprehension ability,
which plays a key role in models of conceptual change. It may be that the students who possess high levels of verbal comprehension are more successful when engaging in the cognitive tasks necessary for conceptual change.

Both the conceptual change (e.g., Posner et al., 1982) and persuasion literatures (Dole & Sinatra, 1998) highlight the importance of comprehension for meaningful change from old to new conceptions. These models suggest that learners must comprehend new information and must restructure their conceptions for change to occur. Research in reading (Kendeou & O’Brien, 2014; McCrudden & Kendeou, 2014) further confirms the importance of comprehension when students are reading text that conflicts with prior belief. When students are able to detect discrepancies and make correct inferences, they are more likely to resolve discrepancies and revise prior incorrect knowledge. Guzzetti and colleagues (Guzzetti, 2000; Guzzetti, Snyder, Glass, & Gamas, 1993; Guzzetti, Williams, Skeel, & Wu, 1997) report that students who use less effective reading strategies, including skimming the material, have greater difficulty drawing inferences from text. Thus, they may confirm rather than modify their alternative conceptions, even when reading refutational text. These less skilled readers appear to need assistance in the form of teacher lead-led discussions to identify conflict between text and prior belief, and to use information to change beliefs. Thus, students demonstrating higher levels of verbal comprehension would be more successful at making sense of the new material, and would find it comprehensible and plausible. It is also likely that such students are better able to retain their correct conceptions over time.

In an attempt to answer the question of whether students maintain correct concepts over time, we conducted a longitudinal study of students from our introductory courses. In addition to the nature of change following refutation, we wanted to know whether certain students are more likely to change their misconceptions. In particular, we were interested in whether students who enter with better verbal comprehension are more likely to change and maintain those changes, compared to students who come in with weaker verbal skills.

In this longitudinal study we followed students over a 2-year period from our introductory psychology classes in which we taught material in one of three ways. Students received instruction on targeted misconception in either (a) refutational teaching (a misconception is activated, then refuted with evidence in text and lecture), (b) standard teaching (provided evidence-based information in text and lecture without activation of the misconception), or (c) we did not address the concept (control condition). Thus, for any given misconception’s content, all students received instruction on that content in only one way. We expected to find that misconceptions related to content taught in a refutational manner would result in greater change compared with than misconceptions related to content taught in a standard manner, or those not covered at all. We also expected to observe the continued influence of the refutational method over time when compared with other methods, and we expected refutation would be more effective in reducing misconceptions for students coming in with stronger verbal comprehension, indexed by SAT Critical Reading scores.

Method

Participants

One hundred and eleven introductory psychology students (68% of those enrolled) participated for course credit by completing an identical psychological information questionnaire pre (Time 1) and post (Time 2). Participants were primarily first-year students (90%) as is typical for this course at this University; the Time 1 sample was 84% female, and 17% minority (primarily Hispanic). Students attended one of eight sections (average size = 25) of the introductory psychology course taught by the authors across three semesters at a private liberal arts college on the West Coast. Both instructors are full professors who have been teaching introductory psychology for over 20 years with standardized curriculum and methods.

Sixteen weeks after completion of their course, students received e-mail solicitations to complete the same questionnaire again. Ninety-seven students completed a third testing later, and 80 students completed a fourth testing, three semesters after the completion of their psychology course. We offered raffles for gift cards as incentives at these follow-up periods.
Student participation varied across testing sessions, resulting in 69 students who had complete data for all four testing sessions. Of the students who completed four testing sessions, 68 had SAT Critical Reading scores available from the registrar (62% of the original sample). The final sample of 68 was 82% female, and 18% minority. Based on data available from three of the eight classes, 82% of the students missed fewer than two days of class.

Course Design

We designed our courses to allow us to assess the effects of method of addressing misconceptions in lecture and readings. We covered eight of the 25 items from the psychological information questionnaire (described below) with a refutational lecture and reading, a standard lecture and reading, or when we did not cover it at all. The items taught in a refutational manner involved learning styles, the Mozart effect, and repressed memories. The items taught in a standard manner involved root causes of psychological trauma, the tongue map, and the importance of the first three years of life. The items not addressed and used for comparison involved whether to change multiple choice exam answers and the fate of “crack babies.”

Materials

Psychological information questionnaire. The questionnaire contained 25 items assessing students’ knowledge of psychological information in an AB format (Bensley & Lilienfeld, 2010; Taylor & Kowalski, 2012). For each item, one option stated the misconception and the other option stated the correct information as supported by the evidence. All 25 items reflected frequently held student misconceptions. We drew items from previous tests of misconceptions in psychology (e.g., “Electroconvulsive shock” therapy is a physically dangerous treatment that is not worth the risk”; Lilienfeld, Lynn, Ruscio, & Beyerstein, 2010) as well as from the popular literature (e.g., “Mozart’s music increases infant intelligence.”) The following is a sample item:

Which statement about the sense of taste is most true?

A. Taste areas for sweet, sour, salty, and bitter are well defined on the tongue.

B. People can perceive all taste qualities all over their tongue.

SAT Critical Reading. We used the Critical Reading test of the SAT to assess differences in students’ verbal comprehension. The test consists of a reading-based comprehension portion and a verbal portion. It has been shown to be a useful measure of reading comprehension and relates positively to the Gates-MacGintie Reading Comprehension test (r = .60; Stiegler-Balfour & Benassi, 2015).

Reading. Course readings addressed claims in either a refutational or a standard manner or not at all. The courses used either the Myers (2012) or Lilienfeld, Lynn, Namy, and Woolf (2010; the remaining two) introductory texts. In each text the eight target items received similar coverage in either a refutational format, a standard format, or not at all.

Lecture. Refutational lectures refuted popular misconceptions. In each lecture we began by presenting the common misconception and then presented the scientific view, followed by discussion of evidence supporting the scientific claim. Standard lectures did not mention the misconception but only provided the scientifically accepted evidence supporting the claim. For comparison items, we did not cover the topic at all.

Procedure

The participants received notification of the study via an e-mail announcement several days before the start of classes. The announcement provided instructions on how to access the survey online, where to begin with informed consent, and then how to complete the questionnaire. The entire process required less than one hour to complete. Students completed the questionnaire before the first day of class (Time 1). They again completed the questionnaire after the last day of formal classes but before, prior to the final exam (Time 2). We then contacted the students one semester after completion of their course (Time 3) and again three semesters following completion of their course (Time 4). At each testing, students completed the entire 25-item questionnaire with the eight target items randomly embedded.
Results

Outcome Measure

For all analyses, the outcome measure was percentage correct on the eight target items from the misconceptions questionnaire. Higher scores indicate the endorsement of fewer misconceptions.

Between Professor Comparison

To examine comparability across professors we conducted a 2x4 analysis of variance (ANOVA) with time as a within-subjects factor and professor as a between-subjects factor. There were no significant differences between professors at any time period ($p > .05$).

Sample Characteristics

To address whether the sample changed based on mortality, we compared scores on the eight items for students who completed the questionnaire at all four time periods with students who completed the questionnaires only at Time 1 and Time 2. Time 1 and Time 2 scores for the 68 students who completed all four assessments on the psychological information questionnaire did not differ significantly from Time 1 and Time 2 scores for the students who did not complete follow-up questionnaires ($N = 43$). A 2 x 2 ANOVA with 2 (between-subjects sample: complete vs. incomplete) x 2 (within-subjects time: pretest vs. posttest) was not significant, $p > .05$. Therefore, mortality did not affect the outcome.

In addition, students whose primary text for the course was Myers (2012) compared with those for whom the primary text was Lilienfeld, Lynn, Namy, et al. (2010) did not differ in misconceptions scores at any assessment period ($p > .05$). This indicates that students reading different texts experienced comparable narratives.

We also compared students’ scores for those who provided information on their major and courses ($N = 63$). Those students who declared a major in psychology by Time 4 ($N = 16$) did not differ at any time period from students who took additional psychology classes but did not declare a major ($N = 10$), or from those who did not take any additional classes in psychology ($N = 37$) ($p > .05$). This suggests that differences at Time 4 could not be attributed to different majors or to taking subsequent psychology courses.

We used the SAT Critical Reading scores at Time 1 to differentiate students as demonstrating higher versus lower verbal comprehension. Because the study began in 2012, all students completed the Old SAT. The SAT Critical Reading median for our entire sample ($N = 111$) at Time 1 was 610, the mean 611, and the standard deviation 84.23. Of the students completing the survey at all four time periods, 28 scored below the median (we grouped them as being lower in verbal comprehension), and 40 scored above the median and we (grouped as higher in verbal comprehension).

Change Over Time

Correlations between student scores on the psychological information questionnaire at Time 1 and Time 2, $r(66) = .35, p = .004$, and Time 1 and Time 4, $r(66) = .32, p = .002$ were significant but modest. Figure 1 depicts mean scores for total accuracy at Times 1 through 4 for each content coverage area. At Time 1, the majority of students endorsed misconceptions assessed in this study at equal rates. At subsequent testing times, students responded to only those items taught in the refutational manner at an accuracy level greater than 50% at any time.

Figure 2 shows mean scores for total accuracy at Times 1 through 4 for the lower and higher verbal comprehension groups. Higher verbal comprehension students reported and maintained accuracy levels greater than 50% whereas lower verbal comprehension students never reached the 50% accuracy level.

The overall questions addressed by this longitudinal study involved whether students would retain a correct understanding of psychological concepts after completion of the introductory course. We were also interested in whether refutational teaching would result in greater retention than standard teaching, and whether retention would depend on students’ initial verbal comprehension level.

We employed mixed ANOVAs to assess student change over time for each of the teaching methods and for high and low verbal comprehension scores. A 2 (between-subjects verbal comprehension: high vs. low) x 3 (between-subjects teaching type: none vs. refutational vs.
standard) × 4 (within-subjects time: pretest vs. posttest vs. one semester vs. end of second year after the course) ANOVA produced the following results: Mauchley’s test indicated that for the variable time, the assumption of sphericity had been violated, $\chi^2(5) = 12.01, p = .035$. We corrected the degrees of freedom for the effect of time using the Greenhouse-Geisser estimate. This analysis showed a main effect of verbal comprehension, $F(1, 66) = 19.61, p < .001, \eta^2 = .23$, a main effect of teaching type, $F(2, 132) = 41.33, p < .001, \eta^2 = .39$, and a main effect of time, $F(2.67, 176.5) = 86.01, p < .001, \eta^2 = .57$.

Two-way interactions qualified these main effects. As seen in Figure 1, there was a significant interaction between teaching type and time, $F(6, 396) = 16.64, p < .001, \eta^2 = .20$. Comparing the refutation format with the standard teaching format, a 2 (between-subjects teaching type: refutational vs. standard) × 2 (within-subjects time: pretest vs. posttest) ANOVA showed that there was a greater increase in accuracy from Time 1 to Time 2 for items taught in a refutational manner compared with a standard manner, $F(1, 67) = 69.04, p < .001, \eta^2 = .51$. Another a separate 2 (between-subjects teaching type: refutational vs. standard) × 2 (within-subjects time: posttest vs. end of third semester following course) ANOVA indicated a greater decline for concepts taught refutationally compared to a standard manner from Time 2 to Time 4, $F(1, 67) = 14.42, p < .001, \eta^2 = .12$. Nevertheless, post hoc analyses on scores at Time 4, showed that concepts taught refutationally remained significantly higher compared to concepts taught in a standard manner $t(67) = 3.58, p < .001$; those taught in a standard manner differed significantly from those not covered at all $t(67) = 2.87, p = .006$.

In the overall $2 \times 3 \times 4$ ANOVA the interaction between verbal comprehension and time was significant, $F(3, 198) = 6.11, p = .001, \eta^2 = .085$. Figure 2 shows that from Time 1 to Time 2, the high comprehension group gained more correct conceptions compared with the lower comprehension group. Furthermore, the higher comprehension group was more likely to maintain those correct conceptions over time. Follow-up $t$ tests using Simes correction clarified the nature of this interaction. Students categorized as having high verbal comprehension did not differ at Time 1 ($p > .05$) and reported more correct conceptions at Time 2, $t(66) = -3.34, p = .001$. Lower verbal comprehension
students declined from Time 2 to Time 4, \( t (27) = 3.26, p = .01 \) but higher verbal comprehension students’ scores did not \( (p > .05) \). There was no interaction between Comprehension and Teaching Type, \( p > .05 \), and no three-way interaction between Comprehension, Teaching Type and Time, \( p > .05 \).

**Discussion**

The purposes of this classroom-based study were to address student misconceptions in either a refutational or standard manner, to follow these students over time, and to determine the durability of any change in misconceptions. At the beginning of the course, all students endorsed all misconceptions at a high level. We found that, on average, students reported fewer misconceptions at the end of a course when we taught those concepts in a refutational manner. Students were able to retain correct concepts for one and a half years after the course, particularly when those concepts had been taught refutationally. Students demonstrating better verbal comprehension acquired and retained more correct concepts. Even items taught in a refutational manner, however, declined. This decline was particularly true for students who had demonstrated poorer verbal comprehension on their college entrance exam.

The findings from this study support research on change in misconceptions (Guzzetti et al., 1993; Lassonde et al., 2016; Taylor & Kowalski, 2012). Students were more likely to relinquish psychological misconceptions when we specifically targeted and addressed those misconceptions, compared to the traditional method of just providing scientifically valid evidence to support claims. In addition to confirming past findings, the current study helps to clarify them. Because most prior research has assessed misconceptions with true/false questions, it has often been unclear whether students’ responses reflect demand compliance (Hughes et al., 2015). Using the AB format, this study demonstrated that students improved in their ability to correctly differentiate the scientifically supported claim from the unsupported claim by the end of the course, particularly when those claims had been taught refutationally. Although the AB testing format is an improvement over past formats (cf., true/false), the misconception assessment still does not provide evidence that students clearly understand the concepts. Additional research to address whether students taught in a refutational manner truly develop a...
deeper understanding of scientific claims is ongoing. We are currently employing experimental methods to examine individual claims presented in differing text formats (refutational vs. standard) while also asking students to explain answers in open-ended response.

In addition to supporting past work on change in misconceptions, this study extends our understanding by describing what happens to students following completion of the introductory course. Much of the research compares student misconceptions at the beginning and end of an introductory course (e.g., Hughes et al., 2013). The current study indicates that students do retain many correct conceptions following the end of a course. Despite improvement, students taught material in a standard way (i.e., just the facts) rarely improved beyond the 50% accuracy level. This finding suggests a lack of a “testing” effect from repeated administration with the same instrument. When we refuted misconceptions, however, there was significant improvement. Unfortunately, over time, students did revert slightly to prior false conceptions. This is not surprising given the degree to which misinformation is prevalent in the media. Greater loss occurred following refutational teaching methods. This may be due to the fact that only refutational teaching methods resulted in retention of correct conceptions at a level greater than 50%.

This study also confirms past findings regarding the role of student verbal comprehension in change (Guzzetti, 2000; Guzzetti et al., 1997). Despite starting out with an equal number of misconceptions, students coming into college with higher levels of verbal comprehension reported fewer misconceptions at the end of the course. The findings using SAT Critical Reading scores support prior research showing relations between misconceptions and other measures of student ability, such as GPA, critical thinking (Kowalski & Taylor, 2011; McCutcheon, Apperson, Hanson, & Wynn, 1992) or course grades (Gutman, 1979). The role of verbal comprehension in predicting change is in line with models of conceptual change (Dole & Sinatra, 1998; Strike & Posner, 1992) and reading comprehension (Kendeou & O’Brien, 2014). In order for students to alter prior knowledge, they need to comprehend the new information and find it plausible or possible based on what they know. The task of knowledge revision, therefore, depends on students’ ability to understand what they hear and what they read. The challenge for instructors attempting to communicate with students is to recognize what students do not understand (e.g., how students are potentially misinterpreting new information), to develop messages that all students can comprehend. Thus, the task of developing materials and activities for changing student misconceptions should be an active and joint enterprise involving instructors, scholars of teaching, educational and cognitive psychologists (Sinatra & Broughton, 2011).

The good news is that refutational teaching helps reduce misconceptions. The bad news is that many misconceptions return regardless of pedagogy. Teasing apart these findings, however, underscores the importance of student characteristics. Students with higher verbal comprehension were able to alter and retain correct conceptions over a 2-year period. Students with lower verbal comprehension maintained some concepts but lost others. Whether these differences reflect differences in the students’ ability to process information at a deep level, or correlated factors such as students’ motivation to learn, or beliefs about the nature of knowledge, is a topic for additional research.

There are both strengths and weaknesses in this study. The study’s strengths lie in the fact that it follows the same students over an extended period of time. We know how we addressed misconceptions for these students in their introductory class and we know their initial level of verbal comprehension based on standardized tests. The design allowed us to make claims regarding how students’ answers to questions about psychological concepts changed over time, and how these changes relate to verbal comprehension and teaching. We can see that both verbal comprehension and teaching make a difference. We can also see that despite a reduction in misconceptions by the end of the course, refutation is not completely effective. Hence, overcoming misconceptions is a teaching and learning challenge.

The naturalistic and longitudinal nature of this study contributed to its weaknesses. Limiting the sample to students within the courses we taught was important in order to control the type of teaching used to address misconceptions. However, the initial sample of students obtained from our courses at Times 1 and 2 declined over
time, despite efforts to retain them. Because a smaller sample participating in a longitudinal study reduces the confidence in conclusions, this study is only a first attempt to understand long-term changes in student misconceptions. Larger samples would not only increase confidence in findings but would allow for additional questions. For example, a large sample would permit modeling of additional student characteristics that might predict who is most and least likely to change misconceptions. Additional weakness in this study relate to the nature of the measure of misconceptions and the nature of the texts. As noted above, even the AB answer format does not demonstrate students’ understanding of concepts. Open-ended questions, concept mapping, or other techniques could provide information on whether students develop a deep understanding of information, and, therefore, can do more than just identify “correct” responses. Finally, because of the nature of this classroom study, we relied entirely on textbooks readings rather than passages we created. The readings that were not standardized. The standard texts clearly differed from the refutational texts in not mentioning specific misconceptions, but other factors such as interest or reading level could not be controlled. Furthermore, it is difficult in a classroom situation to know whether students read the assigned text, experimental studies specifically controlling for text differences and teaching single misconceptions in both refutational and standard formats are needed to supplement more naturalistic studies.

In reflecting on the importance of studying student misconceptions, the research can be justified at a variety of levels. At the course level, it is important to know that students hold misconceptions, and to understand the best way to address and ideally change those misconceptions. Instructors can use information on student misconceptions to identify and target their incorrect beliefs and ideally revise them. At the curriculum level, it is important to consider what students learn in a college program, and whether that learning is retained beyond graduation or course completion. If our majors have difficulty retaining empirically valid information about psychology, should we include frequent inoculations throughout the curriculum? By becoming aware of the tenacity of misconceptions, as well as their tendency to reemerge, we are alerted to the need to see teaching and learning as an active dialogue. At the broadest level, misconceptions are everywhere. As the opening discussion of the AAAS survey (“Major Gaps Between the Public,” 2015) suggests, the public is poorly informed. As some have suggested, there may be serious consequences of such misinformation (Furnham & Hughes, 2014). Thus, changing misconceptions, for students in our courses as well as among the general public (Cook, Ecker, & Lewandowsky, 2015), is critical for an appropriately informed society.

References


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