How accurate is a freshman’s judgement of her own mathematics task performance? Students may underestimate or overestimate the correctness of their responses. The aim of this study is to analyze overconfidence in 42 mathematics items in 422 freshmen and the possible cause of this overconfidence. Being over- or under confident is a bias of calibration. Biases of calibration are defined as cognitive distortions between the subjective estimation (E) of correctness and the obtained correctness (O). In overconfidence, a student’s E > O. Macbeth (2009) considers that judgement of one’s own performance is a metacognitive process connected to metacognitive skills and experiences.

One of Macbeth’s (2009) propositions, the effect difficulty-facility, states that the easier a task is, the more overconfidence.

Kruger and Dunning (1999) linked incompetence to miscalibration of own performance, due to a deficit in metacognitive skills. Often people do not have the capacity to distinguish right from wrong, and may overestimate their performance.

Finn & Tauber (2015) refer to feelings of confidence in one’s knowledge and so of overconfidence on processing fluency.

From a superficial understanding of correct rules, mistakes may arise, as an incorrect extension, with the conviction, due to a lack of metacognition (Malle, 1993), that the responses are correct.

The study is based on a 42 item diagnostic assessment in which 422 students had to judge whether their answer to each item was correct or not. It differs from other studies in the way data were analyzed by item, and not by student. Thus, the items in which the students showed the highest degree of overconfidence were detected.

The difference between subjective estimation of success compared with real success (C=E-0) was greater in the following items:
223 students (53%) have a wrong answer to the item: 25-5×2+4= and think they did fine. Operating from left to right is the most common mistake.
151 student’s (36%) subjective estimation of correctness was in the item: √(x^2+y^2 ), with the more common answer x+y. This may be an overgeneralization of the rule √(x^2y^2 ), where superficially similar conditions may create the mistake.
In one transformation, 148 freshmen (35%) were overconfident in performing: (y(y+2)+(y+2))/(y+2)
This error may arise from the fluency effect. Students have simplified rational algebraic expressions.

Results of the study show that if freshmen are not aware of their overconfidence in some items, they do not see the need to improve skills. They may also be overconfident in their learning.

To remedy this, the teacher may ask students to slow down and think more carefully. Slowing down and increasing effort are the correct strategies to use.

References:

Keywords: Mathematics, overconfidence, fluency, ease-difficult effect, overgeneralization.