Learning from mistakes; balancing masculine and feminine strategies in learning science.

The literature (Jackson, 2002; Dutch Advisory Council for Education, 2009; Cottaar, 2012) and teachers (Cottaar, submitted) agree that in general, female students have a much better work attitude than male students. This is often associated with over-representation of female students in higher education (Blondal & Adalbjarnardottir, 2012; Jackson & Dempster, 2009; Younger, Warrington, & Mclellan, 2002). However, in the Dutch academic STEM fields of study female students are a minority and in high school advanced physics, these students still lag behind in achievement (Meelissen & Drent, 2009; Cottaar, 2012). Therefore, I have investigated gender differences in (the interrelationships between) work attitude and achievement in a diversity of science related fields of academic study in order to measure the effectiveness of a more feminine compared to a more masculine learning strategy.

Two surveys are conducted both involving academic freshman science students at 12 universities throughout the Netherlands (around 18 years old). The first survey (N=3230), conducted at the start of the academic year of 2008-2009, is used to measure the science capability of the students; the second survey (N=1558), conducted at the end of the same year, measured their perceived work attitude at university and their academic success. Structural equation modeling and T-tests are used to analyze the male and female samples resulting in two separate but comparable models on Academic Success; additional information is gathered through interviews with 29 carefully selected high school physics teachers throughout the country (Cottaar 2012; Cottaar, submitted)

In general, the data show that females report to work significantly harder in all 'traditional' aspects of work, e.g. time investment, working on problem solving exercises, quantity and quality of reading. However, females do not perform any better for it (Cottaar, submitted). I conclude that the way females work in order to learn (feminine learning strategy) is significantly less effective in science related fields of study than the masculine learning strategy. I argue that female students should be challenged to take more risks in order to find their own optimal learning strategy for science related subjects as males show to do in my study. Unfortunately, a tendency in female students to avoid risks (of failure) prevents them from using more effective strategies (Carlone, 2004; Yestrumskas, 2004).

With Dai (2002), I want to argue that balancing the feminine and masculine learning strategies in students could benefit them all. After my presentation, I would like to discuss the increasingly popular idea that our western school system 'kills creativity' essential for STEM subjects and Arts (STEAM) (Sir Ken Robinson). Recall from the introduction that this high school system tends to benefit females more than males. I argue that in physics and later on in science related courses of study this creativity (associated with the male learning strategy) is essential and that female students would benefit from being taught to be more 'creative' and less 'docile'. I propose that in order to 'teach creativity' effectively, all students should be taught to focus on their mistakes rather than to avoid them, as females tend to do, or deny them, as males tend to do.

Keywords: Gender; Achievement; High School; Academic; Learning Strategy.

Bio statement

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