Design education has to achieve high quality, in order to prepare engineering design students to cope with the complex demands of their future working life. Therefore, it has to be empirically proved in how far an educational concept contributes to that goal. In this paper a concept of a methodological training course and an empirical study conducted in order to evaluate the training course are introduced. The aim of the study was to find out if the students applied the methods that were taught in the course in an appropriate way. For this purpose a qualitative, process-oriented research approach was implemented, which analysed the participants’ cognitive operations during method application and compared them to the method’s intentions and requirements. The results indicated that students applied most methods correctly but had difficulties to grasp the whole range of the more complex and demanding methods “QFD” (Quality Function Deployment) and “TRIZ” (Theory of Inventive Problem Solving). Reasons for these difficulties are discussed and measures are proposed that aim at the adaptation of the complexity of these methods to the designers’ experience. Finally, conclusions for design education in general and the research on educational concepts in design are drawn.