

Chapter 5

Affect in Statistics Cognition

ABSTRACT

This chapter focuses on affective process in statistics education which could influence cognitive development. We begin with a discussion of short-term high-intense affective features (emotions) and use the most well researched construct in computer and statistics education (anxiety) to illustrate how these processes can influence learning. We then discuss long term low intense affective features (moods) and outline how moods can contribute to statistical attitudes. We argue that affective features must be continuously assessed throughout the entire learning process, and discuss theorize how online learning environments can use the principles of differentiation to enhance affect toward statistics education.

...[F]or the context of learning outside the classroom in a mathematics and statistics course: certain emotional components, such as the cognitive, affective or motivational, could play a more important role in the emotional experience of learning... - Niculescu et al., 2015, p. 452

1. INTRODUCTION

Affect, defined as the experience of feeling emotions (Hogg, Abrams, & Martin, 2010), is of central interest in psychological research (Blaney, 1986; Christianson, 2014; Lewis, Haviland-Jones, Barrett, 2010; Russell, 2003),

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and has emerged as a powerful explanatory variable in statistics education (Niculescu, et al., 2015). Yet despite its importance, research has only just begun to scratch the surface of emotions can influence learning statistics in online environments (DeVaney, 2010; Ramirez, Schau, & Emmioglu, 2012; Tudor, 2006).

Such studies have repeatedly noted differences among affective variables (Niculescu, et al., 2015), with emphasis studying differences in emotions - such as anxiety (Onwuegbuzie & Wilson, 2012) and attitudes (Emmioglu & Capa-Aydin, 2012). As such, this Chapter discusses the role of affective variables in statistics cognition.

While acknowledging the need to understand how affective processes influence cognitive outcomes (Clore & Schnall, 2005; Giner-Sorolla, 1999; Kim, Lim, & Bhargava, 1998), the exact nature of this relationship is still debated (Duncan & Barrett, 2007; Forgas, 2008). Yet for our purposes, what really matters is how affective processes can impact statistics cognitions. To begin addressing this question, we focus on how affect can uniquely influence both generalized (Blaney, 1986) and domain-specific (Mikels, Reuter-Lorenz, Beyer, Fredrickson, 2008; Tremblay, Gardner, Heipel, 2000) cognitive processes, and their related neural sub-systems (Balleine, 2005; Ledoux, 2012; Lane, Nadel, Allen, & Kaszniak, 1999; Van Toller, 1988).

Because affect is such an ambiguous term, we frame out discussion of affect on the most well researched features of affect in statistics education; anxiety and attitudes. Anxiety, which serves as an example of a high intense, but likely short term (situational) emotion (2.1), is a central variable of interest in both online (Chua, Chen, & Wong, 1999) and statistics (Cruise, Cash, & Bolton, 1985) education, with a considerable amount of literature outlining how it influences student learning (2.2). However, anxiety is not simply a construct that can influence learning, but can be considered an outcome of statistics education. To further illustrate affective outcomes, we then shift discussion to mood, a relatively long term process with low emotional intensity, to serve as a contrasting example of a long term educational moderator (3.1). Finally, we outline environmental considerations to explore how affect may play a role in self-regulation (4.1) and motivation (4.2) in online environments. We conclude this Chapter with a summary of what we can learn from the study of affective processes in online statistical environments, and where the field may be headed (5).

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