The Stress of Online Learning

Deana L. Molinari
Washington State University Intercollegiate College of Nursing, USA

Alice E. Dupler
Washington State University Intercollegiate College of Nursing, USA

Naomi Lungstrom
Washington State University Intercollegiate College of Nursing, USA

INTRODUCTION

Stress is recognized today as impacting both quality and length of life (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002). Stress was defined by Hans Seyle (1936) as the unspecified physiological response to aversive stimuli. The stress of learning is not yet understood. If stress impacts physical and emotional well-being, and lifelong learning is needed to survive in the information age, then a study of the stress of learning may impact both nursing and educational practice.

Learning stress can create a number of long-term physiological and performance complications. Stress reduces immune function, making people vulnerable to disease. Studies indicate stress hormone levels can be predictive of relationship problems and chronic disease. Reducing stress could avoid colds, flu, and mild depressive symptoms, which complicate student relationships and achievements, thus increasing stress (Glaser, Robles, Malarkey, Sheridan & Kiecolt-Glaser, 2004). Stress also blocks learning by limiting perceptions, thinking, and memory capabilities during performance, triggering higher levels of stress during later performance events (Sapolsky, 1998). The inability to think or remember concepts, procedures, and methods during patient encounters can threaten lives.

Until recently, researchers found measuring learner stress under normal everyday conditions challenging. Self-report methods are unreliable due to the filtering that occurs between the experience and the report (National Space Biomedical Research Institute, 2003; Razavi, 2001). Measurement of physiological function during events is considered the most reliable reading of lived experience. The measurement of cortisol and cardiopulmonary variables provides a picture of stress as it occurs.

Increased glucocorticoids impair memory function (Kilpatrick & Cahill, 2003), problem solving, and spatial recognition memory (Rozzendaal, de Quervain, Ferry, Setlow, & McGaugh, 2001; McEwen & Seeman, 2003). Cortisol, a glucocorticoid, is regulated by the adrenocorticotrophic hormone (ACTH) (Carrasco & VandeKar, 2003) and plays a major role in stress (Charney, 2004), learning, and memory processes (Bremner et al., 2004) that underlie behavioral adaptation (Gesing et al., 2001). Salivary cortisol reacts within 10-20 minutes of a stressor.

Cardiac and respiratory systems instantaneously respond to perceptions (Sapolsky, 1998). Until recently, heart and respiratory variables could only be measured periodically, providing a snapshot of physiological fluctuations which can miss peak and valley responses. Recent technology advances make it possible to include biophysical measures in educational design models.

Nursing school is considered a stressful education experience (Hughes et al., 2003). Students experience stress-related ailments like ulcers and autoimmune disease (Heath, Macera & Nieman, 1992; Reid, Mackinnon & Drummond, 2001). This motivates colleges to provide stress intervention programs (Pitts, 2000). After graduation, nursing is considered a high-stress profession where role strain and burnout are frequent occurrences. The complex job requires making life and death decisions under pressure, and few rewards counter the job demands (Siegrist, 2000). Although nursing is an extremely stressful profession, the measurement of educational stress is an important topic for most professions.

Learning stress needs to be addressed as part of the educational experience. This article presents a framework that permits the study of biophysical simultaneously with environmental and instructional variables.

A report of a feasibility study asking if technology can detect differences in stress levels of online students in different settings is also presented.

Learning Allostasis Model

The Learning Allostatis Model (see Figure 1) was designed to better understand learning stress and is based on the work of Bruce McEwen. The term *allostasis* means "maintaining stability (or homeostasis) through change"; it was introduced by Sterling and Eyer (1988) to describe how the cardiovascular system adjusts to resting and active states. McEwen developed the Allostatic Load Model to explain how physical, environmental, and psychosocial elements combine in a cascading cause-and-effect process that accumulates over time and alters the body's natural mediators producing disease processes. Experience, genetics, and behavior all contribute to the body's reaction under aversive conditions (McEwen, 1998). The Learning Allostasis Model attempts to explain individual student stress reactions to learning events.

The learning allostatic model posits individuals begin learning events affected by biological, environmental, and major life events. The learner's approach to the event includes protective behaviors that may either help or hinder achievement. Individual characteristics impacting the learning event include: genetic makeup, milieu, life experience, learning experience, and learning strategies. Instructional design is given similar weight to individual characteristics. Instructional design variables include pedagogy, facilitation, and institutional support.

Figure 1. Allostatic learning model
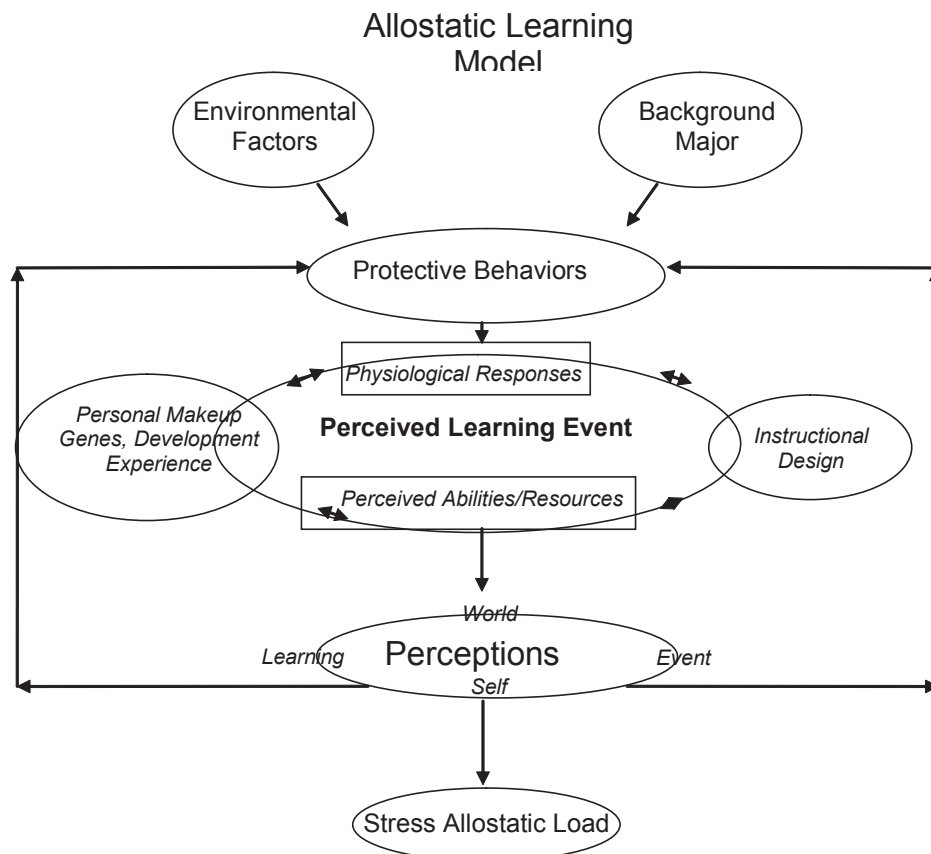
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