Emotional Design and First-Generation Learners: Predicting Control-Value Appraisals and Achievement in Online Learning Environments

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Abstract

Online education has expanded access to postsecondary learning, yet first-generation college students continue to experience lower persistence and achievement rates in fully online programs. Although emotionally responsive course design has been linked to engagement, a clear understanding of how design influences learners' perceptions of control, task value, and achievement remains underdeveloped. This gap limits the ability of institutions to design online environments that effectively support the motivational and emotional needs of first-generation learners.

The purpose of this quantitative correlational study was to examine the relationships among emotional design, perceived control-value appraisals, and academic achievement in online learning among first-generation postsecondary students in the United States. Guided by Control-Value Theory, emotional design was conceptualized as a multilevel construct encompassing visceral, behavioral, and reflective levels that shape learners' emotional and motivational experiences. The study investigated whether emotional design predicted perceived control and value, and whether these appraisals predicted achievement.

Participants were adult first-generation students enrolled in introductory online courses at a large private postsecondary institution. Using a convenience sample, data were collected through validated self-report instruments assessing emotional design perceptions and control-value appraisals, along with final course grades and persistence indicators. Structural equation modeling was used to test direct and indirect relationships among latent variables.

Results indicated that emotional design significantly predicted perceived control and task value and demonstrated a strong direct association with academic achievement. While a specific indirect pathway through positive activating emotions was observed, the overall indirect effect

was not significant, indicating that emotional pathways did not fully mediate the relationship between design and achievement. Findings suggest that emotional design functions as an integrated appraisal mechanism that simultaneously shapes learners' sense of agency, task relevance, and performance outcomes.

These results extend theory by positioning emotional design as a contextual embodiment of control and value in online learning environments and provide practical guidance for designing inclusive courses that support first-generation learners. Future research should examine these relationships across diverse populations, instructional contexts, and longitudinal timeframes to refine emotionally responsive design strategies that promote equitable student success.

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Chapter 1: Introduction

Online education in the U.S. has become a vital part of higher education, but its rapid expansion raises essential questions about student success. By fall 2021, 9.4 million undergraduates, representing 61% of all undergraduates, were enrolled in at least one distance course (National Center for Education Statistics [NCES], 2023). The sector continues to expand. In 2023, the percentage of students enrolled exclusively in distance education courses at postsecondary institutions in the fall was 25.6%, indicating strong demand and increased access (NCES, 2023). Despite increasing participation and investment, concerns about engagement, persistence, and completion continue, underscoring the need to understand how design, motivation, and emotion influence online learning outcomes.

Research indicates that students in online-only degree programs are less likely to complete their degrees compared to those who take some face-to-face courses (Ortagus et al., 2023). This negative impact extends across demographic groups, disproportionately affecting students, particularly low-income students and veterans, who are significantly more likely to fail to earn degrees in fully online programs (Ortagus et al., 2023). In achievement-focused environments, maintaining engagement and motivation remains both a persistent challenge and a critical lever for improving learning outcomes (Akpen et al., 2024). While existing research highlights the barriers to online learning success, meaningful progress requires deeper investigation into interventions that foster learner engagement and motivation.

Building on this foundation, the role of emotions in academic achievement has become a central focus in educational psychology, especially in the online context (Wang et al., 2021; Mutlu-Bayraktar, 2024). As online platforms expand access to higher education, they simultaneously introduce new challenges for sustaining learner engagement, persistence, and

performance (Rahmani et al., 2024). These platforms are structured as achievement environments, spaces organized around goals, assessments, and growth; however, they lack the interpersonal cues and environmental supports that traditional classrooms provide, which play a decisive role in shaping emotional engagement. This gap makes it increasingly imperative to identify approaches that foster positive emotional experiences by design. Within this broader context, emotional design has emerged as a promising strategy for enhancing motivation, sustaining engagement, and improving learning outcomes in digital environments.

Emotional design encompasses the intentional use of design elements, such as color, imagery, interactivity, and user interface structure, that elicit emotional responses (Norman, 2004). According to contemporary research, these responses are not incidental to academic success. Instead, they play a central role in shaping how students engage with and process instructional material. Empirical studies have demonstrated that emotional design can promote positive emotions, such as interest, enjoyment, and curiosity, in achievement environments, thereby enhancing cognitive engagement and motivation (Endres et al., 2020). For example, research has demonstrated that aesthetically pleasing or emotionally expressive learning interfaces can increase situational interest, reduce extraneous cognitive load, and improve sustained attention during complex tasks (Endres et al., 2020; Ruf et al., 2022). Other findings suggest that emotional design can support deeper learning by promoting a sense of personal relevance, decreasing feelings of frustration, and encouraging persistence in difficult subject areas (Berweger et al., 2022; Camacho-Morles et al., 2021).

The theoretical foundation for understanding the relationship between emotional design and achievement is offered by Control-Value Theory (CVT) (Pekrun, 2006), which emphasizes how learners' appraisals of control over learning tasks and the value they assign to those tasks

influence their emotional experiences and, consequently, their achievement-related behaviors. Research supports the connection between control, value, and emotional appraisals that directly influence achievement in learning environments through engagement. For example, Bakir-Yalçin & Usluel (2024) demonstrated that control and value serve as precursors to emotional appraisals that foster engagement and motivation in learning environments, including online or digital settings.

Despite a growing body of research, the field lacks a coherent, evidence-based framework for applying emotional design to reliably support learners' control-value appraisals. While several studies affirm the benefits of emotional design on learning outcomes, few have explicitly linked specific design elements to the mechanisms described by CVT. Many research studies apply emotional design in inconsistent terms, making it difficult to determine which emotional design elements contributed to achievement. In addition, much of the existing literature generalizes findings across broad student populations, leaving questions about how emotional design may function differently for diverse learner groups. This gap is particularly relevant for student populations that have historically faced barriers to academic success, such as first-generation college students. These learners often navigate educational environments without the benefit of intergenerational academic knowledge and support, which can affect their sense of belonging, perceived control, and engagement (Harackiewicz et al., 2015). As emotional experiences are known to vary across demographic and cultural groups, the design of emotionally supportive online learning environments may hold value for improving outcomes among students who are at greater risk of attrition or underperformance.

The intersection of emotional design, control-value appraisals, and learner diversity presents an opportunity to advance theory and practice. Theoretically, it provides an opportunity

to deepen our understanding of how design elements interact with psychological processes to influence achievement. This line of inquiry has the potential to support more equitable educational outcomes and generate practical guidelines for engaging learners across a range of academic domains and learner characteristics.

Statement of the Problem

The problem addressed in this study was a theoretical gap in linking emotional design (Norman, 2004) to perceived control-value appraisals defined by Control-Value Theory (CVT; Pekrun, 2006) and achievement in an online learning environment for first-generation students. Evidence suggests that emotional design, in an elastic sense, significantly influences learning outcomes by affecting motivation, engagement, and cognitive processes (Bakir-Yalçin & Usluel, 2024; Beymer et al., 2023; Endres et al., 2020). CVT specifically links positive emotions, such as enjoyment and interest, to performance achievement, whereas negative emotions, such as boredom and frustration, hinder achievement (Camacho-Morles et al., 2021; Sharp et al., 2020). Despite these individual theoretical alignments, there remains no consistent, evidence-based framework integrating emotional design with perceived control-value appraisals, which are predictors of academic success (Ruf et al., 2022; Obergriesser & Stoeger, 2020). Additionally, emotional engagement varies based on learner characteristics like first-generation status, cultural background, and academic context (Goldman et al., 2024; Schwartze et al., 2024; Cui et al., 2024; Cheng et al., 2023; Lo, 2024). Current research often targets general populations without explicitly defining emotional design or exploring its differentiated impacts across diverse groups and contexts, further limiting its applicability. Additionally, the prevalent self-report methods have not yet established measured relationships between emotional design mechanisms and student achievement (Simonton & Garn, 2020; Tze et al., 2023).

Without an articulated theoretical framework, designers and educators may lack the guidance necessary to effectively foster sustained engagement, risking increased dropout rates, reduced retention, and diminished academic achievement (Berweger et al., 2022). This study seeks to bridge this theoretical gap by validating the connection of Norman's (2004) emotional design framework and CVT (Pekrun, 2006), focusing specifically on perceived control-value among first-generation postsecondary students.

Purpose of the Study

The purpose of the quantitative correlational study was to examine the relationship between emotional design principles, specifically visceral, behavioral, and reflective levels, perceived control-value, and student achievement in online learning among first-generation postsecondary students in the United States. This study directly addressed the gap in understanding how emotional design influences learning outcomes for first-generation learners, using Control-Value Theory (CVT) as its guiding framework. More specifically, the study aimed to explore the extent to which students' perceived control and value of learning predicted their emotional responses and academic performance within an online course that was intentionally designed using emotional design principles. Participants were recruited from online, introductory-level courses offered at a large, private postsecondary institution serving adult learners in career and skilled trade programs in the United States. A convenience sampling approach was used to identify potential participants, with selective criteria applied to include only adult learners who self-identified as first-generation college students. The target sample size was a minimum of 360 participants. Data collection involved using validated self-report instruments to assess emotional design, perceived control-value, and course performance data to measure achievement. Structural equation modeling (SEM) was used to examine the

hypothesized relationships among the three latent variables: Emotional Design (ED), Perceived Control-Value (PCV), and Achievement (ACH), each of which was represented by a set of observed indicators.

Introduction to Theoretical Framework

This study was guided by Control-Value theory (CVT) (Pekrun, 2006) and an Emotional Design framework (Norman, 2004). Together, these frameworks provided a lens to examine the relationship between emotional design elements and learning outcomes in digital educational environments. Both frameworks emphasize the central role of emotion in shaping cognitive engagement and motivation in achievement environments.

Control-Value Theory (CVT) posits that emotions in achievement settings arise from two key appraisals: perceived control over activities and the subjective value assigned to those activities (Pekrun, 2006; Pekrun, 2024). In learning environments, perceived control reflects learners' beliefs about their ability to influence or manage learning outcomes, while perceived value relates to the relevance, importance, or interest they assign to the task. Emotions such as enjoyment, pride, boredom, or anxiety are shaped by combinations of these appraisals (Pekrun, 2006; Pekrun, 2024). CVT categorizes emotions based on valence (positive or negative), activation (activating or deactivating), temporal orientation (prospective, concurrent, retrospective), and focus (activity vs. outcome) (Pekrun, 2006; Pekrun, 2024).

The Emotional Design framework (Norman, 2004) complements CVT by identifying how achievement environments can be designed to evoke emotions that support engagement and, ultimately, influence achievement. Norman categorizes emotional responses to design into three levels: the *Visceral Level*, which reflects instinctive reactions to sensory aspects like aesthetics; the *Behavioral Level*, which focuses on usability and the pleasure of interaction; and the

Reflective Level, which involves conscious evaluation and long-term meaning. This model offers a systematic approach for embedding measurable emotional triggers into design, making it an ideal complement to CVT's explanation of the psychological appraisals that drive these emotions.

The integration of these two frameworks supported the proposition that emotional experiences, shaped by perceived control and value (CVT), can be intentionally designed at the visceral, behavioral, and reflective levels (Norman), thereby enhancing learner achievement. Rather than treating these frameworks separately, this study used them in tandem: CVT explains the internal emotional appraisals, while Norman's framework informed the design mechanisms that influence those appraisals.

These frameworks guided the development of the study's problem statement, which centers on the lack of emotional intentionality in the design of digital learning environments. The frameworks also informed the purpose statement and research questions, which explored how emotional design elements based on perceived control and value impact learners' performance.

Introduction to Research Methodology and Design

This study examined the impact of emotional design on perceived control-value and academic achievement in online learning environments. A quantitative methodology investigated the relationships among emotional design levels, learners' emotional appraisals, and academic outcomes. The study leveraged Structural Equation Modeling (SEM) within a predictive correlational design to test theoretical relationships and evaluate direct and mediated effects. SEM was suited for this study as it enables the simultaneous analysis of latent constructs and helps identify underlying causal pathways (Maruyama, 1997). Overall, SEM is a powerful tool for validating theoretical constructs, exploring causal relationships, and improving the rigor of

social science research (Bentler & Chou, 1987). The SEM approach aligned with the study's purpose, grounded in Norman's (2004) emotional design framework and Control-Value Theory (Pekrun, 2006), and guided the conceptualization of emotional design and perceived control-value as multidimensional constructs. SEM mapped how learners' perceived control and value appraisals connect to achievement.

The study targeted adult first-generation college students enrolled in introductory online courses at a U.S. institution. This population was of interest due to their underrepresentation in higher education and the unique challenges they face that may influence emotional and academic experiences. Participants were selected through convenience sampling from the researcher's institution, with selective criteria to include only adult learners who identify as first-generation students. A commonly recommended guideline is to have at least 20 participants per estimated parameter to ensure model stability and reliable standard errors (Kline, 2015). In this study, the model includes an estimated 18 parameters, including six factor loadings, six measurement error variances, three latent variable variances, and three structural regression paths. Based on the 20:1 ratio, a minimum sample size of 360 participants was recommended to ensure stable estimation. Recruitment occurred via learning platforms such as Brightspace, with materials including eligibility criteria, study details, and consent procedures.

Emotional design was assessed based on Norman's (2004) three-part model. Visceral design was measured using the Self-Assessment Manikin (SAM) (Bradley & Lang, 1994), a validated pictorial scale assessing pleasure, arousal, and dominance. Behavioral design was measured using the System Usability Scale (SUS) (Brooke, 1996), supported by Lewis (2018) for reliability in usability contexts. Reflective design was assessed using the Learning Engagement Scale (LES) (Hassan et al., 2020), which incorporates elements from the Utrecht

Work Engagement Scale for Students (UWES-S) (Schaufeli et al., 2002) to capture reflective emotional engagement. Perceived control-value was measured using the Achievement Emotions Questionnaire – Short (AEQ-S) (Bieleke et al., 2021), which assesses emotional responses in academic contexts. Two indicators were used: control appraisal (students' perceived agency over learning) and value appraisal (the importance they assign to learning tasks). The AEQ-S has demonstrated strong psychometric properties across student populations (Macías León et al., 2022). Academic achievement was operationalized as students' final course grades in raw percentage points and student persistence into the next course, serving as the primary dependent variables and objective outcome measure.

Research Questions

RQ1

To what extent do emotional design principles (visceral, behavioral, reflective) predict first-generation students' perceived control-value appraisals in an emotionally designed online learning environment?

RQ2

To what extent do perceived control-value appraisals predict first-generation students' achievement in an emotionally designed online learning environment?

Hypotheses

$H1_0$

Emotional design principles do not significantly predict first-generation students' perceived control-value appraisals in online learning environments.

$H1_a$

Emotional design principles significantly predict first-generation students' perceived control-value appraisals in online learning environments.

$H2_0$

Students' perceived control-value appraisals do not significantly predict their achievement in emotionally designed online learning environments.

$H2_a$

Students' perceived control-value appraisals significantly predict their achievement in emotionally designed online learning environments.

Significance of the Study

The dissertation study was important because it addressed critical gaps in the current understanding of how emotional design impacts motivation and achievement, particularly among first-generation college students in online learning environments. By applying Norman's (2004) emotional design framework and testing it within the context of Control-Value Theory (CVT), the study offered empirical insights into how perceived control and value mediate the relationship between emotional design and academic success. This contributed significantly to educational psychology by extending the CVT framework to include design principles that intentionally shape emotional experiences. Furthermore, the study contributed to the literature by quantitatively validating the application of CVT in digital learning contexts for first-generation learners using structural equation modeling (SEM). These results advanced theory and guided future research on the emotional and motivational dimensions of online learning.

By addressing the problem of limited design frameworks and insufficient research on diverse learner populations, the study could also offer a meaningful contribution to future design applications in online environments. It not only examined the relationship between CVT and

Emotional Design but also proposed a coherent, testable framework that could advance both, expanding motivational theory into the design field. The research helped educators better understand how to encourage lasting engagement and academic performance, particularly for students who face systemic barriers to success. Achieving the study's purpose yielded evidence-based strategies that promoted inclusivity and retention by addressing the emotional and motivational needs of first-generation learners. Answering the research questions demonstrated how emotional design can function as a tool for equity, helping institutions close achievement gaps and lower dropout rates. Completing the study positively affected theory, practice, and policy by creating more inclusive learning environments where all students, regardless of background, can succeed.

Definitions of Key Terms

Achievement Environment

An achievement environment is a setting that cues and supports achievement-related behaviors by promoting evaluative standards, knowledge acquisition practices, goal clarity, and opportunities to experience competence (Pekrun, 2024).

First Generation College Student

An individual whose parents did not complete a baccalaureate degree; specifically, this includes individuals whose parents are both uneducated at this level, as well as those who lived with and were supported by only one parent, provided that this single parent also did not complete a baccalaureate degree (Higher Education Act of 1965, 2023)

Latent Variables

A latent variable is an unmeasured theoretical construct inferred from observed variables. It is generally estimated using multiple observed variables that indicate the latent construct (Anderson et al., 2013).

Observed Variables

Observed variables are measurable characteristics or data points that can be directly recorded or quantified, such as test scores or survey responses (Anderson et al., 2013).

Online Education

Online learning involves instructional delivery via the Internet, using a variety of digital formats and communication tools to support learner engagement and content mastery (Means et al., 2009)

Usability

Usability refers to the extent to which a product enables users to effectively, efficiently, and satisfactorily achieve their goals. It reflects how well the product functions in relation to its intended purpose while providing users with a sense of control (Norman, 2004).

Summary

This introduction provided an overview of the growing importance of emotional experiences in online learning environments, particularly through the lens of emotional design and Control-Value Theory (CVT). As online education expands, understanding how design affects emotional engagement and achievement is increasingly relevant. The study was guided by two research questions: (1) To what extent do emotional design principles predict first-generation students' perceived control-value appraisals? and (2) To what extent do these appraisals predict achievement? Corresponding hypotheses explored whether these relationships are statistically significant in emotionally designed online learning environments.

The introduction highlighted a gap in current research. While emotional design has shown positive effects on motivation and learning, there is no coherent framework that connects emotional appraisals to achievement outcomes. This gap is significant to address for first-generation college students, who often face unique challenges that influence emotional engagement and academic success. The statement of the problem emphasized the lack of an evidence-based framework connecting emotional design to control-value appraisals and learning outcomes, particularly among diverse learners. The purpose of the study was to quantitatively examine how emotional design (visceral, behavioral, and reflective levels) influences perceived control and value appraisals, and in turn, academic achievement, using Structural Equation Modeling (SEM).

The theoretical framework integrated Norman's Emotional Design levels (2004) and Pekrun's CVT (2006) to explain how design features can intentionally elicit emotions that influence learning behavior. These frameworks guided the development of the research questions and overall study design. The research methodology outlined a quantitative correlational approach targeting first-generation adult learners in online courses. Validated instruments measured emotional design perception, emotional appraisal, and achievement outcomes. The significance of the study lies in its potential to provide practical, theory-based strategies to improve learning outcomes, particularly for underrepresented student populations. Findings supported the design of more inclusive, emotionally engaging digital learning environments.

Chapter 2: Literature Review

The purpose of the quantitative correlational study was to examine the relationship between emotional design principles, specifically visceral, behavioral, and reflective levels, perceived control–value, and student achievement in online learning among first-generation

postsecondary students in the United States. The problem addressed in this study was a theoretical gap in the literature linking emotional design to perceived control-value appraisals and achievement in an online learning environment for first-generation students.

To frame this problem, the literature review was organized to move from broad conceptual foundations to the specific empirical and theoretical gap the study addressed. It first clarifies the two core theories that anchor the study, then surveys what is known about their application in digital learning, examines the distinctive circumstances of first-generation learners, and closes by synthesizing the shortcomings that justify the present research.

The literature review examines two significant theories related to achievement emotions and emotional design. First, it outlines Control-Value Theory (Pekrun, 2006), which posits that perceived control and task value generate discrete emotions. These emotions subsequently influence student engagement and performance. Second, it delves into an Emotional Design framework (Norman, 2004), explaining three levels of design: visceral, behavioral, and reflective. The review summarizes evidence indicating that design features can shape learners' affect, motivation, and cognition, particularly within digital environments.

Next, the review synthesizes research on control-value appraisals, emotions, and achievement in educational contexts, connecting learners' control-value judgments to emotions such as enjoyment, boredom, or anxiety, and their academic outcomes. In the context of emotional design in online learning achievement, empirical studies review the connection between interface aesthetics, interactivity, and usability to interest and enjoyment. This ties into emotional design levels (Norman, 2004), which are also linked to outcomes and persistence in fully online or blended courses. The alignment between Control-Value Theory (Pekrun, 2006) and Norman's (2004) framework are outlined. Additionally, the review examines the targeted

study population of first-generation college students in online learning contexts, focusing on the emotional and motivational challenges they face in postsecondary educational environments, including issues of belongingness, self-efficacy, and attrition risks, while highlighting the significance of this population. Finally, the review highlighted that a research gap exists in the areas of emotional design and control-value appraisals, as literature critically compares findings that call for further research on diverse populations and notes that few studies align specific design elements with control-value appraisals.

Databases and Keyword Searches

This research was primarily conducted using a federated search feature across EBSCOhost's Navigator. Key terms to explore within this search include emotional design, control-value theory, achievement, motivation, online learning, distance education, postsecondary education, and first-generation students. To narrow the scope of the research, parameters were set to include only scholarly, peer-reviewed publications from the last five years. For foundational theoretical research, backward reference searching was used to identify seminal works, specifically author searches for notable academics such as Pekrun and Norman. The search also integrates APA Psyche Tests to enhance the breadth of data.

Theoretical Frameworks: Control-Value Theory and Emotional Design

Control-Value Theory (CVT)

Control-Value Theory (CVT) (Pekrun, 2006; Pekrun, 2024) provides a comprehensive theoretical framework for understanding motivation, particularly how emotions influence the engagement dynamics of achievement environments, including digital learning spaces. CVT posits that achievement emotions arise from two core appraisals: control, which is the perceived ability to influence outcomes, and value, which refers to the importance of the task (Pekrun,

2006). Pekrun establishes that these appraisals directly impact emotions such as enjoyment, frustration, and boredom, which, in turn, affect academic engagement and ultimately achievement. Emotions arise from the interplay of perceived control and value assigned to the task. Perceived high control and high value lead to positive feelings such as enjoyment (Pekrun, 2006). Conversely, high control, low value results in boredom or irritation, leading to maintained performance but diminished motivation. When control is low, but the task is highly valued, learners may experience negative emotions such as anxiety. Finally, in situations where both control and value are low, emotional responses tend to manifest as apathy, boredom, mental withdrawal, and minimal engagement, resulting in a disengaged learning state.

Control-Value Theory (CVT) presents a foundational framework for studying cognitive learning processes by classifying users' emotional experiences into four types of responses. CVT classifies emotions by valence, positive or negative, and arousal, activating or deactivating. For example, positive activating emotions, such as excitement and hope, energize individuals (Pekrun, 2024). In contrast, positive deactivating emotions consist of pleasant feelings that provide calmness, such as contentment, relaxation, and relief (Pekrun, 2024). On the negative side, negative activating emotions are unpleasant yet motivating, encompassing feelings like anxiety, anger, and frustration (Pekrun, 2024). Finally, negative deactivating emotions refer to unpleasant feelings that can demotivate or calm the individual, including hopelessness, sadness, and boredom (Pekrun, 2024). These emotions initiate an influence loop connecting engagement and memory (Pekrun, 2024). People can manage emotions through various strategies, including altering appraisals, modifying situations, and enhancing competencies (Pekrun, 2006).

Control-Value Theory of Achievement Emotions presents a framework for evaluating how emotions function in academic settings by establishing interconnected relationships among

appraisals, emotions, antecedents, and effects. At the heart of the theory are two core appraisals, subjective control and subjective value, referred to in operational form as perceived control-value, which serve as the primary antecedents of achievement emotions (Pekrun, 2006). Subjective control refers to a learner's perceived ability to influence academic activities and outcomes, such as believing that effort leads to success (Pekrun, 2006). Subjective value pertains to the importance a learner places on those activities or outcomes, such as valuing academic success for future career opportunities (Pekrun, 2006). These appraisals can shift contextually depending on an individual's achievement goal or circumstances (Bakir-Yalçin & Usluel, 2024; Beymer et al., 2023).

Achievement emotions are further categorized into two types: activity emotions and outcome emotions. Activity emotions, such as enjoyment, frustration, or boredom, are connected to ongoing tasks and the learning process itself. Outcome emotions relate to the results of academic activities and are categorized into prospective emotions, such as hope or anxiety, which anticipate future outcomes, and retrospective emotions, including pride or shame, which arise from evaluating past performance (Pekrun, 2006). These emotions significantly impact learning processes. They affect cognitive resources by consuming attention and mental capacity; positive emotions tend to enhance cognitive flexibility and performance, while negative emotions may impair it (Pekrun, 2006; Pekrun, 2024). Emotions also influence motivation, with enjoyment promoting both intrinsic and extrinsic drive, and boredom diminishing it. Similarly, they shape learning strategies: positive emotions foster deeper and more creative approaches, whereas negative emotions often lead to surface-level or rigid processing. Emotions also impact self-regulation, where positive states enhance autonomous regulation, while negative emotions may increase dependence on external structures (Pekrun, 2006). Ultimately, these emotional

effects can support or hinder academic achievement, depending on how they interact with other cognitive and motivational mechanisms.

Control-Value Theory also emphasizes reciprocal feedback loops, highlighting that emotions and appraisals influence each other cyclically over time (Pekrun, 2006). For example, experiencing success can foster enjoyment, which strengthens motivation and reinforces perceptions of control. Conversely, anxiety may prompt avoidance behaviors that undermine performance and further reduce perceived control. These patterns unfold in the context of both individual and social antecedents. Personal factors, such as personality traits, control beliefs, and value orientations, shape emotional responses, while social and cultural influences, including instructional quality, classroom norms, teacher feedback, and broader cultural values, play a critical role in shaping appraisals and emotional experiences (Pekrun, 2006; Pekrun, 2024).

Development of Control-Value Theory

The development of the Control-Value Theory of Achievement Emotions progressed over several decades, integrating diverse psychological approaches to explain the antecedents and effects of emotions in academic settings. The impetus was an expectancy-value model of anxiety (Pekrun, 1984, 1988, 1992), which emphasized the role of control and value appraisals in emotional arousal. This foundation was later broadened to encompass a broader range of achievement emotions, including joy, hope, pride, anxiety, hopelessness, shame, and anger, as well as their influence on academic engagement, self-regulation, and performance (Pekrun, 1992, 2000). As the theory evolved, it drew upon and integrated several key psychological perspectives. These included expectancy-value approaches to emotions (Pekrun, 1992; Turner & Schallert, 2001), attributional theories of achievement emotions (Weiner, 1985), theories of

perceived control (Patrick et al., 1993) and models exploring the emotional impact on learning and performance (Fredrickson, 2001).

Control-Value Theory Rationale

Control-Value Theory (Pekrun, 2006; Pekrun, 2024) serves as the foundational framework for this study, as it offers a comprehensive and empirically supported explanation of how achievement emotions are generated and regulated within academic environments. As a theory specifically designed to address emotions in structured achievement environments such as classrooms and online learning platforms, CVT is uniquely positioned to inform research at the intersection of motivation, emotional experience, and educational design.

The theory directly informed the study's problem statement by identifying a theoretical gap in linking emotional design features, such as aesthetic and interactive elements, to control-value appraisals. It also shaped the purpose of the study, which is to empirically test how emotional design principles influence perceived control, value, and achievement among first-generation college students in online courses. Most critically, CVT guided the development of the research questions and structural model, which explores the mediating role of control-value appraisals in the relationship between emotional design and learning outcomes. By focusing on appraisal mechanisms, CVT provides a clear pathway for examining how emotionally evocative design can serve as a scaffold for psychological empowerment and academic success.

Another motivational theory, Self-Determination Theory (SDT; Ryan & Deci, 2017), was considered as a foundation for this research. Self-Determination Theory is a widely used framework for understanding human motivation, particularly in educational contexts. It posits that motivation and well-being are optimized when three basic psychological needs are fulfilled:

autonomy, competence, and relatedness (Ryan & Deci, 2017). SDT has been especially influential in promoting learner-centered environments and supporting intrinsic motivation.

However, despite its strengths, SDT does not align as directly with emotional design principles as Control-Value Theory (CVT). While SDT overlaps conceptually with CVT, particularly in its emphasis on autonomy and perceived control, it lacks a body of research on how specific design elements influence emotional engagement. CVT (Pekrun, 2006), on the other hand, is specifically tailored to achievement environments, such as classrooms, offering a structured model that links learners' emotions to their perceived control over learning tasks and the value they assign to those tasks. This makes CVT especially useful for examining how design can influence academic motivation and performance.

Emotional Design Framework

"Emotional design" is a broadly defined concept that is often subjective and situational. Across studies, it has been explored as a strategy in multimedia learning environments and instructional materials that integrate design features to evoke positive emotions, enhance engagement, and improve learning outcomes. For this research, a framework developed by Norman (2004) was used to outline the structure and principles of emotional design. According to Norman, emotional design involves the purposeful integration of aesthetic and interactive elements that elicit positive emotional responses, thereby enhancing users' cognitive engagement and motivation. The framework organizes emotional design into three levels: visceral, behavioral, and reflective. Visceral design focuses on immediate emotional reactions to sensory elements, such as vibrant colors or anthropomorphic graphics (Norman, 2004). Behavioral design emphasizes usability and functionality, ensuring that tasks are intuitive and cognitively manageable (Norman, 2004). Reflective design fosters deeper cognitive and emotional

connections by promoting personal relevance and long-term motivation (Norman, 2004). This framework is often applied to a wide range of products and environments to subtly capture users' attention and sustain engagement in their tasks.

Development of Emotional Design Framework

An emotional design framework as defined by Norman (2004) evolved through a synthesis of theories from ecological psychology, affective science, and cognitive modeling. Three significant intellectual contributions influenced its development, including the theory of affordances (Gibson, 1979), the cognitive structure of emotions articulated by Ortony et al. (1988), and collaborative work from Ortony et al. (2005) on multi-level affective functioning.

The theory of affordances (Gibson, 1979) provided the foundational concept for Norman's (2004) emotion design framework, as perception is directly shaped by what the environment offers an individual or what it "affords" them, based on the relationship between environmental properties and the observer's capabilities. Gibson (1979) describes a classic affordance as a knee-high, horizontal, flat, rigid surface like a chair seat, bench, or ledge. Its geometry and height make it evident that it "affords sitting," supporting weight and enabling a stable posture. Norman (2004) expanded this idea into the field of design, especially behavioral design, by highlighting how well-designed objects should indicate their potential uses. Norman refers to this as the user's model, where a user can envision using the designed item or interface. An example might be a horizontally designed button that controls an action of a horizontal nature. This direct perception of functionality is key to ensuring usability and reducing cognitive load (Norman, 2004). Norman adapted affordances to explain why users intuitively know what actions are possible when engaging with a product, which aligns with his behavioral-level design considerations, where functionality and user expectations must match effortlessly.

The cognitive-emotional appraisal model developed by Ortony, Clore, and Collins (1988) informed Norman's understanding of how design influences users' emotions. Ortony, Clore, and Collins proposed that emotions aren't random or purely physical reactions. Instead, they're structured and meaningful responses to evaluations, which involve assessing how events, actions, or objects relate to our personal goals, standards, or attitudes. This appraisal-based framework directly supported Norman's view that emotions arise from interactions with design and that those emotions can be systematically anticipated and influenced. The categorization of emotions into event-based, agent-based, and object-based also complements Norman's tripartite design model, which comprises visceral, behavioral, and reflective levels, targeting different levels of user response, from instinctive impressions to deep reflection.

Finally, Norman's collaborative work with Ortony and Revelle (2005) on affect and information processing levels helped unify these theoretical strands into a functional model for design. Their work describes how emotional responses operate across three levels of cognitive processing**:** reactive (visceral), routine (behavioral), and reflective. This directly parallels Norman's emotional design framework, where visceral design evokes automatic, affective reactions; behavioral design supports smooth, habitual use; and reflective design connects to meaning-making, identity, and personal values. The authors also emphasize that affect, motivation, cognition, and behavior interact across all levels to enable effective functioning (Ortony et al., 2005). This interdependence aligns with Norman's assertion that good design must address both usability and emotional resonance to create meaningful, engaging experiences.

Together, these influences shaped Norman's belief that emotional responses to design are not only real and measurable but can be systematically understood and intentionally crafted. By

integrating affordance theory, emotion appraisal models, and multi-level affective processing, Norman (2004) shapes and distinguishes the levels of emotional design that drive experience.

Emotional Design Framework Rationale

The Emotional Design Framework (Norman, 2004) provides the complementary design-oriented foundation for this study, offering a layered model of how a learning environment's aesthetics, usability, and personal meaning influence users' emotional experiences. This framework informed the problem statement by clarifying how emotional design features may serve as key levers for shaping the learner experience yet remain under-theorized in terms of their direct psychological impact. It guided the purpose of the study by providing a structured basis for operationalizing emotional design across measurable dimensions. The dimensions are used to examine their influence on learners' perceived control and value, as defined by Control-Value Theory (Pekrun, 2006). The framework also shaped the research questions by enabling a systematic inquiry into which levels of design are most predictive of emotional and academic outcomes. Integrating the emotional design framework with CVT allows this study to explore not only *whether* emotional design affects achievement, but also *how* specific design mechanisms elicit the appraisals that drive achievement emotions in online educational settings.

In addition to Norman (2004), other theories have addressed motivation and user experience in digital and learning environments. The Cognitive-Affective Theory of Learning with Media (CATLM; Moreno & Mayer, 2007) and Cognitive Load Theory (CLT; Plass et al., 2010) both offer valuable insights into how cognitive and emotional factors influence learning. They primarily focus on the mechanics of information processing and motivation within instructional contexts. CATLM emphasizes how affect and motivation mediate cognitive engagement, and CLT centers on managing mental effort through instructional design. However,

neither framework fully addresses the multi-layered nature of emotional engagement that Norman's Emotional Design Framework does. The framework uniquely incorporates visceral, behavioral, and reflective levels of emotion, offering a more comprehensive account of how aesthetics, usability, and personal meaning interact to shape user experience, extending beyond learning efficiency to include identity, emotion-driven memory, and long-term motivation. Additionally, there is more alignment between Norman's emotional design framework and Pekrun's (2006) emotional appraisals.

Control-Value Appraisals, Emotions, and Achievement

Appraisal Effects in Online Learning

Research shows that CVT can effectively promote engagement in a range of achievement settings, including digital learning environments and informal learning situations. In online learning environments, value appraisals were found to influence both positive and negative emotions. For instance, intrinsic and utility values were linked to positive emotions such as enjoyment, while high perceived costs were associated with increased frustration and boredom (Berweger et al., 2022). Emotion regulation strategies in online settings further highlight the importance of fostering task value and control beliefs to enhance user engagement (Bakir-Yalçin & Usluel, 2024). Similarly, research on classroom environments, particularly among English majors in China, demonstrated that study interest, autonomy support, and peer enthusiasm significantly reduced boredom, a key deactivating emotion (Cheng et al., 2023). This underscores CVT's emphasis on intrinsic motivation and supportive learning contexts. Conversely, boredom, often linked to disengagement, indicated the need for task redesign to enhance relevance and stimulation (Cui et al., 2024; Sharp et al., 2020). Schwartze et al. (2024) found that boredom in mathematics in middle school learners can arise from both over-challenge

and under-challenge due to users' perceptions of control and value. Research in informal learning settings, such as summer STEM programs, provides valuable insights into the reach of CVT. Beymer et al. (2023) reported that high-quality programs that fostered active participation and higher-order thinking reduced boredom and enhanced excitement, validating CVT's premise that control and value appraisals mediate emotional experiences.

Cross-Cultural Findings

Other evidence suggests that the notion that perceived control-value leads to better performance and learning is not universally applicable. Control appraisals, for instance, do not always consistently predict emotions, with their effects varying depending on cultural and situational factors (Bakir-Yalçin & Usluel, 2024; Beymer et al., 2023). Zhang et al. (2024) support this inconsistency, finding that in two distinct cultures —Chinese and Dutch —the motivational drivers that lead to learner engagement varied significantly based on cultural norms and contexts. Similarly, high-value appraisals that are shown to be successful are sometimes linked to frustration, particularly when users perceive limited control over outcomes (Beymer et al., 2023). These variations highlight the nuanced interplay between control and value, suggesting that cultural and contextual factors influence how CVT operates.

Variances in Research Outcomes

Reviewed studies have surfaced several key factors that drive variance in outcomes related to motivation and achievement. One primary source is the nature of contextual and instructional variables. For example, Beymer et al. (2023) found that specific program quality indicators, such as opportunities for higher-order thinking and active participation, had a strong influence on state emotions and outcomes in informal summer STEM programs. While Control-Value Theory (CVT) suggests that control and value appraisals mediate the relationship between

context and emotion, Beymer found that emotions and outcomes were often more directly shaped by program characteristics, indicating an incomplete mediation process. Similarly, Berweger et al. (2022) reported that both within-person (situation-level) and between-person (trait-level) differences in value appraisals significantly predicted students' emotional experiences during online learning, particularly when intrinsic and utility values varied across situations. Another driver of variance lies in the emotional and motivational profiles of learners. Cheng et al. (2023) identified distinct emotional profiles among vocational college students engaged in online learning that were linked to differences in expectancy beliefs, which in turn predicted self-regulation outcomes, such as time management and academic procrastination. These findings underscore that learners' emotional reactions are not monolithic; rather, they are shaped by individualized perceptions of task difficulty and relevance

Measurement Instruments and Reliability

Measurement design and methodological choices also contribute to variability in findings. Simonton and Garn (2020) highlighted a critical conceptual issue: intrinsic value and enjoyment are often conflated in the literature, despite being distinct constructs within the context of CVT. Their empirical work demonstrated that intrinsic and extrinsic value appraisals should be treated separately from enjoyment to avoid measurement contamination and ensure theoretical precision. Studies that fail to differentiate these constructs may report inflated or ambiguous relationships between variables, leading to inconsistent outcomes (Simonton and Garn).

Methodologically, most of the studies analyzed here made efforts to account for variability, but limitations remain. Both Berweger et al. (2022) and Beymer et al. (2023) employed experience sampling methods (ESM), which enable high ecological validity and the

capture of in-the-moment emotions. However, the richness of ESM data can also introduce within-person noise, which complicates the detection of stable patterns. Cheng et al. (2023) and Schwartze et al. (2024) used latent profile analysis, which is useful for revealing emotional co-occurrence patterns but is sensitive to sample size and less suited to testing directional hypotheses. Meanwhile, Beymer et al. (2023) employed structural equation modeling (SEM), a rigorous approach, but found that program quality variables did not significantly predict control or value appraisals, suggesting potential mismatches between theoretical constructs and operational measures. Together, these methodological choices highlight that while many studies draw from robust frameworks like CVT and expectancy-value theory, inconsistencies in construct definition, data collection, and analysis techniques can limit the comparability and generalizability of results

Emotional Design in Online Learning Achievement

While few studies explicitly apply Norman's (2004) emotional-design framework in educational research, many implicitly leverage its core principles, particularly the use of aesthetic and functional elements to shape emotions and achievement outcomes. This study hypothesized that perceived control–value can be shaped through intentional design. Building on a seminal multimedia experiment by Um et al. (2012), the first rigorously controlled test of "emotional design" research, which demonstrated that positive emotions can be effectively induced through the design of multimedia learning materials using bright, warm colors and round shapes (Liew et al., 2022; Wong & Adesope, 2021). Emotional design, as outlined in Um et al. (2012) maintained or increased positive emotions during learning, whereas externally induced emotions tended to decrease over time. Um et al.'s study is important because it demonstrated that thoughtfully crafted visual aesthetics can elicit positive emotions, leading to improved

outcomes learning. It also provided the methodology and vocabulary that future researchers can build upon as a foundation.

Norman identifies three levels of emotional design—visceral, behavioral, and reflective—each playing a distinct role in how users experience and engage with learning environments. The following sections examine how design features aligned with each level can be used to support positive emotions and improve educational outcomes.

Visceral Level

Norman (2004) described visceral level design as one designed to incite a user's initial emotional reaction to a design. User reactions are generated in response to sensory stimuli. Research on interface design, colors, and other elements that incorporate sensory stimuli highlights the potential significance of emotional design in promoting user engagement at this level. Aesthetic and emotional design elements, such as warm colors, anthropomorphic shapes, and expressive interface styles, were found to positively influence learners' emotional responses and engagement, which in turn supported interest and improved learning outcomes. Endres et al. (2020) demonstrated that emotional design in videos triggered situational interest, which in turn mediated sustained engagement and late-phase learning performance. Ruf et al. (2022) demonstrated that aesthetic app interfaces can stimulate students' interest and learning in science topics by eliciting emotional and cognitive responses through expressive and game-style designs. Wong and Adesope (2021) confirmed that emotional design features, such as colors and anthropomorphic graphics, significantly enhanced learning performance, intrinsic motivation, and positive affect, while reducing perceived task difficulty. Other studies utilize the concept of emotional cues, such as an agent tutor's gestures or expressions, to foster value (Choi et al., 2024).

The evidence suggests that positive visceral cues, such as warm colors and anthropomorphic rounded shapes, act as a proximal trigger that lifts learners' perceived control and task ease, thereby bolstering motivation and immediate comprehension without reliably extending to far transfer or satisfaction (Plass et al., 2014; Um et al.). At the same time, the gender effects reported by Liew et al. (2022) and the absence of cultural analyses in earlier studies challenge the assumption that such cues elicit universal emotions, implying that Norman's visceral level must be reconceived as socially situated rather than purely perceptual.

Behavior Level

Norman (2004) stated that behavioral design is about performance and, perhaps more importantly, the perception of performance from the user's point of view. The design fosters a positive emotional response when the user feels in control and believes their needs are met, whether articulated or unarticulated (Norman, 2004). Existing research that explores behavioral design often focuses on measuring whether emotional design can lessen extraneous cognitive load in interaction design. These findings suggest that the effectiveness of emotional design depends on striking a balance between cognitive demand and learner engagement. Pentaraki et al. (2024) found that emotional design enhances cognitive factors, such as self-efficacy, perceived academic control, and task values, which in turn influence learning-related emotions. Parallel evidence from interface-redesign research suggests that clarifying affordances and feedback loops can enhance action-control expectancies; a peer-instruction tool redesign resulted in increased correct answer revisions and student satisfaction (Englund et al., 2023). Choi et al. (2024) found that adding emotional gestures to cognitive gestures lowers extrinsic cognitive load and increases germane cognitive load. It's important to note that emotional design does not always produce positive learning outcomes. Liew et al. (2022) caution that emotional gestures in

multimedia learning environments may elevate extrinsic cognitive load, potentially detracting from learning. However, Skulmowski and Xu (2022) counterargue that certain aesthetic features enhance learning by promoting deeper cognitive engagement, even if they increase cognitive load.

Reflective Level

Norman (2004) asserted that reflective design is concerned with meaning. This meaning emerges when a user interacts with a design, evoking emotions as it meets a need and generates value (Norman, 2004). Current research supports these ideas. Wong and Adesope (2021) identified that emotional designs enhance intrinsic motivation by creating relevant learning experiences and assigning value to learning. Ruf et al. (2022) found that aesthetic app designs foster situational interest by engaging users through emotionally stimulating features, such as game-like interfaces, which trigger immediate affective and cognitive engagement. Similarly, Johansen et al. (2023) highlighted that making learning tasks personally relevant significantly enhances autonomous motivation, vitality, and positive affect. Johansen et al. also observed that situational interest arises when users perceive content as meaningful in relation to their values and goals, leading to increased effort and engagement during the learning activity. These findings underscore that reflectiveness is not necessarily generalizable or static but depends on how learning environments and materials align with users' immediate contexts and experiences.

Connecting Emotional Design Levels to Control-Value Appraisals

The emotional design framework (Norman, 2004), consisting of three emotional design levels, aligns neatly with Control-Value Theory (CVT) (Pekrun, 2006; Pekrun, 2024). In an achievement environment, the model of emotional design can be viewed as a systemic primer

that directly feeds into the two antecedents specified by CVT: perceived value and perceived control, thereby shaping the achievement emotion patterns that CVT predicts.

At the visceral level, color palettes, anthropomorphic icons, and sound effects operate pre-attentively; they convey to learners that the interface looks pleasant, interesting, or fun before any conscious analysis transpires. CVT regards such immediate appreciation as an appraisal of intrinsic-positive value or a judgment that an activity is rewarding in its own right (Pekrun, 2024). High intrinsic value, even in the absence of explicit control cues, is sufficient to spark enjoyment, curiosity, and other positive-activating activity emotions that CVT links to flexible thinking and deeper engagement (Pekrun, 2024). Visceral aesthetics primarily influence the value lever, thereby establishing an affective foundation for learning.

The behavioral level introduces usability scaffolds, with clear affordances, responsive feedback, and calibrated challenge that incite action (Norman, 2004). Anderson and Fast (2022) demonstrate that well-structured information environments reduce cognitive thrashing and let users stay in flow, an outcome Norman (2004) identifies as the hallmark of successful behavioral design. Those design moves raise action-control and action-outcome expectancies**,** the twin cognitions Pekrun (2006) names as the core of perceived control. When control appraisals rise while value remains high, CVT forecasts a shift toward enjoyment or relaxed flow; when value is high but control declines, frustration or anger surface (Pekrun, 2006). Behavioral design, then, serves as the fulcrum for maintaining the balance between high value and high control, and for preventing the combination of low control and high importance that results in anxiety.

Finally, the reflective level weaves meaning, identity, and long-term utility into the interface (Norman, 2004). Such elements boost attainment and extrinsic-positive value (Pekrun, 2024). Reflective design also encourages learners to attribute success to their sustained effort,

thereby strengthening internal, control-dependent pride pathways that CVT differentiates from mere outcome joy (Pekrun, 2006). Empirical support for this visceral-to-value link comes from Um et al. (2012), whose design manipulation elevated intrinsic interest and immediately raised enjoyment appraisals. Reflective level design essentially guards against the scenario CVT labels as hopelessness, characterized by high stakes and low efficacy, by simultaneously heightening value and reinforcing self-agency, thereby channeling emotions toward hope and pride, which are empirically tied to achievement (Pekrun, 2006).

Seen together, Norman's layers trace a coherent appraisal sequence. Visceral cues ignite intrinsic value, a phenomenon information designers call 'cognitive scaffolding' (Anderson & Fast, 2022), behavioral affordances ratchet up perceived control, and reflective meaning deepens utility value and internal agency. Each layer adjusts the cognitive dials of value and control identified by CVT as precursors of specific achievement emotions. Designing across all three levels, therefore, offers a systematic route to engineer the emotionally fertile states such as enjoyment, interest, hope, and pride, which CVT shows lead to persistence and higher performance, while avoiding conditions that lead to boredom, frustration, or anxiety.

First-Generation College Students in Online Learning Environments

Recent empirical research leaves little doubt that first-generation college students (FGCS), those whose parents have not earned a four-year degree, embark on and navigate higher education along a markedly different trajectory than their continuing-generation peers. Even when access barriers are removed, FGCS disproportionately encounter financial instability, cultural mismatch, and emotional strain, which collectively hinder academic persistence and success (Cameron et al., 2023). National data confirm that FGCS now represent a significant share of undergraduates in the United States. According to the 2019–2020 National

Postsecondary Student Aid Study, more than 40% of all undergraduates received Pell Grants, federal financial aid awarded to students from low-income backgrounds, and FGCS are disproportionately represented among those recipients (Cameron et al., 2023). This financial vulnerability often limits the time, resources, and flexibility FGCS can devote to their studies.

Research by Dumais et al. (2013) indicates that first-generation adult learners often pursue education for personal fulfillment and tend to utilize institutional support services more frequently than their continuing-generation peers. However, they face persistent barriers, including workplace–school conflicts and limited familiarity with academic systems. These challenges are compounded in digital environments, where design and motivation intersect. Rahmani et al. (2024) underscore that motivational and support-related factors, such as inadequate preparation, poor system usability, and lack of responsive support, are primary contributors to dropout in online higher education. Similarly, Lo (2024) demonstrates that autonomy-supportive learning climates significantly shape students' competence beliefs, perceived task value, and emotional engagement, all of which are crucial for academic persistence. Together, these findings suggest that online programs serving first-generation adults must go beyond accessibility and usability by fostering motivational and emotionally responsive learning environments that are tailored to their unique needs and life contexts.

Longitudinal research further quantifies the achievement disparities. Phillips et al. (2020) found that FGCS were 51% less likely to graduate within four years compared to their continuing-generation peers. Even among those who remained enrolled, FGCS experienced persistent academic disadvantages, with average GPAs trailing by 0.05 points from the first year through graduation. The same study revealed that FGCS rated their social standing on campus 0.62 points lower (on a 10-point ladder), and this self-perception significantly predicted

academic outcomes beyond prior achievement. These findings suggest that the achievement gap is not only educational but also social and psychological in nature. Goldman et al. (2024) reinforced these trends in a multi-institutional analysis, reporting that only 80% of FGCS had graduated or were still enrolled after six years, compared to 90% of their non-FGCS counterparts. The researchers noted that many FGCS who did persist extended their studies beyond the traditional four-year timeline, often due to external demands such as employment or caregiving responsibilities.

While academic preparation and financial constraints explain part of the FGCS achievement gap, psychosocial dynamics offer a deeper insight into why the gap persists over time and across various settings. Phillips et al. (2020) found that FGCS individuals tended to hold stronger interdependent motives (e.g., helping family, giving back to the community) and weaker independent motives (e.g., standing out, self-expression) compared to their peers. This cultural mismatch with the dominant norms of higher education, particularly at elite institutions that reward independence, contributed to a reduced sense of belonging and academic engagement (Phillips et al.).

Emotional Patterns

Emotional patterns also play a critical role. Goldman et al. (2024) found that FGCS reported significantly higher levels of negative achievement emotions such as anxiety, frustration, and boredom, even when controlling for task value and interest. These emotions, often triggered by experiences of disconnection, underperformance, or unclear expectations, can inhibit executive functioning and self-regulated learning capacities that are essential for success in online education. Additionally, support, which is often perceived as lacking among FGCS, is more nuanced than commonly assumed. In a study of 427 FGCS in Pakistan, Zulfiqar et al.

(2025) found that perceived autonomy-supportive parental involvement significantly enhanced both intrinsic and extrinsic academic motivation. Notably, extrinsic motivation exerted the strongest direct effect on GPA. This suggests that when families support educational goals in ways that align with students' need for autonomy, academic performance improves, even in the absence of formal college-going experience.

Digital Skill and Access Gaps

The theoretical framework of Control-Value Theory (CVT) offers a valuable lens through which to understand how online learning design can either reinforce or reduce achievement gaps among this population. CVT posits that students' achievement emotions are shaped by their appraisals of control and value. These appraisals, in turn, influence motivation, engagement, and performance (Camacho-Morles et al., 2021). Choi et al. (2025) applied this framework to a study of 13 active-learning STEM classrooms. They found that instructional environments emphasizing mastery goals, personal relevance, and supportive instructor behavior increased students' sense of control and value. These appraisals significantly predicted positive achievement emotions such as curiosity and enjoyment, which are crucial for persistence. Given that FGCS often begin with lower perceived control and higher utility-driven motivations, CVT-aligned design elements may offer disproportionate benefits for this group.

Designing for First-Generation Learners

Three evidence-based design principles stand out for supporting adult first-generation college students (FGCS) in achievement-oriented online settings. First, structure that amplifies control is vital. Within Control-Value Theory (CVT), perceived control is a primary antecedent of positive achievement emotions and persistence (Pekrun, 2006). FGCS, who often report lower self-efficacy and higher uncertainty (Phillips et al., 2020), benefit from interfaces that minimize

guesswork through straightforward navigation, pacing scaffolds, and actionable feedback. These features align with Norman's behavioral level, where usability and smooth function shape moment-to-moment interaction (Norman, 2004). For instance, when Englund et al. (2023) simplified peer-instruction screens, learners engaged more with feedback and posted more accurate responses, illustrating how intuitive behavioral cues can buffer cognitive load and sustain engagement.

Second, tasks that elevate value through relevance are crucial in enhancing student motivation. According to the Control-Value Theory (CVT), when students attach high utility or attainment value to a task, it follows that motivation and positive emotions increase (Pekrun, 2006). Assignments that draw on students' communities, cultural identities, or long-term goals directly address these value appraisals and engage with Norman's reflective level, where design promotes meaning and identity integration (Norman, 2004). Research by Goldman et al. (2024) revealed that participation and persistence among first-generation college students (FGCS) increased when course projects aligned with their personal narratives and career aspirations. Similarly, Phillips et al. (2020) demonstrated comparable improvements in belonging and GPA when curricular examples reflected students' lived experiences.

Finally, social presence that cushions negative emotions is vital. FGCS disproportionately report anxiety, isolation, and cultural mismatch (Cameron et al., 2023; Goldman et al., 2024). Features such as timely instructor feedback, peer discussion spaces, and inclusive language create an autonomy-supportive climate that Lo (2024) links to higher competence beliefs, intrinsic value, and positive affect. By normalizing diverse educational paths and signaling support, these elements dampen negative emotions, reinforcing the control-and-value appraisals at the heart of CVT (Pekrun, 2006). They also touch both the visceral layer, through welcoming

visual tone, and the reflective layer, by affirming the identity and purpose of the emotional design framework (Norman, 2004). Collectively, research converges on a clear mandate: online programs for FGCS must move beyond basic accessibility and be intentionally designed for control, value, and emotional safety. Doing so not only aligns with CVT and emotional-design theory but also addresses the documented financial, cultural, and psychological barriers that continue to widen the achievement gap (Rahmani et al., 2024; Dumais et al., 2013).

Emotional Design and Control-Value Appraisals: The Research Gap

Control-Value Theory (CVT) highlights how learners' appraisals of control and value influence their emotions and engagement (Pekrun, 2024). However, research rarely addresses how digital learning environments can be intentionally designed to support these appraisals, especially for historically underachieving populations. For example, while Englund et al. (2023) report significant learning gains after interface updates, they omit appraisal measures, reflecting a common gap in usability research. Norman's (2004) emotional design framework helps bridge this gap by linking intuitive, meaningful design to users' sense of agency and purpose. The three design levels — visceral, behavioral, and reflective — offer a structure for understanding how digital achievement environments influence motivation, while CVT explains why such emotionally attuned designs can support academic achievement.

Construct-Clarity Challenges

The existing literature on emotional design in educational contexts reveals several persistent research gaps that constrain the field's coherence, generalizability, and inclusiveness. One of the most pressing issues is the fragmented and inconsistent operationalization of emotional design elements**.** Studies grounded in frameworks such as Control-Value Theory (CVT) often conflate or inconsistently distinguish between key constructs like intrinsic value,

extrinsic value, and enjoyment (Simonton & Garn, 2020). Similarly, while emotional design strategies, such as color and gesture, are commonly applied, they are rarely mapped explicitly to a specific design framework, like Norman's emotional design framework. This lack of definitional and theoretical clarity hinders replicability and limits the cumulative explanatory power of emotional design research across contexts.

Closely related is the absence of a coherent and unified theoretical foundation guiding much of the emotional design literature. Many studies incorporate design elements intended to evoke affect, such as warm colors, anthropomorphic features, or emotionally expressive agents, but do so without systematic grounding in established theoretical models. For example, Choi et al. (2024) and Endres et al. (2020) implemented affective design interventions to improve engagement and persistence. applying cognitive and emotional principles in parallel rather than as an integrated framework. This fragmentation limits the development of predictive theories and obstructs efforts to compare findings meaningfully across studies.

Inclusive-Design Research Needs

A second significant gap involves the underrepresentation of diverse and vulnerable learner populations**.** While emotional design has demonstrated benefits for learner engagement and interest (Plass et al., 2014; Wong & Adesope, 2021), most research samples are homogeneous, often comprising Western, college-aged, and middle-class individuals. Few studies investigate how emotional design may impact learners differently across lines of identity or context. Goldman et al. (2024) found that first-generation college students (FGCS) experience more negative emotions and perceive a higher cost associated with learning tasks, with few interventions designed to address these disparities. Similarly, Liew et al. (2022) revealed gender-based discrepancies in emotional responses to color: warm tones enhanced male learners'

performance but impaired female learners', suggesting that universal application of design principles may inadvertently disadvantage some learners.

Methodological Innovations

Finally, findings across the literature reveal that emotional design outcomes are highly context-dependent and methodologically variable, which challenges generalizability. Wong & Adesope (2021) showed that while emotional design modestly improves retention, motivation, and comprehension, outcomes are moderated by participant characteristics, instructional settings, and design implementations. Ruf et al. (2022) also found that aesthetic interface design enhanced science learning and interest for secondary students, but the effects were contingent on learners' developmental stage and the content domain. Additionally, studies by Berweger et al. (2022) and Beymer et al. (2023) highlight that situational and environmental factors, such as program quality, perceived task value, and momentary autonomy, may influence emotional responses more directly than CVT's traditional control and value appraisals predict. Together, these gaps suggest a critical need for more integrative theoretical models, inclusive design practices, and context-sensitive methodologies to advance motivational research.

Despite the potential of emotional design to enhance engagement and learning outcomes, key gaps remain. The interplay between cultural differences, task complexity, and cultural contexts in shaping the effectiveness of emotional design strategies has not been fully explored. Additionally, empirical research lacks integration of Norman's emotional design levels (visceral, behavioral, reflective) with CVT's appraisal dimensions (control and value). Addressing these gaps is crucial for developing a comprehensive, user-centered framework that creates emotionally intelligent digital learning environments tailored to diverse learners and contexts.

Summary

This review examines the conceptual foundations, empirical applications, and research gaps related to emotional design and achievement emotions in online learning, with a particular focus on first-generation college students (FGCS). The study is anchored by two core frameworks: Pekrun (2006) Control-Value Theory (CVT) and Norman's Emotional Design Framework (2004). CVT explains how students' perceptions of control and task value shape achievement emotions such as enjoyment, anxiety, and boredom, which in turn influence motivation and academic performance. Norman's framework classifies emotional design into three levels: visceral, behavioral, and reflective, illustrating how aesthetics, usability, and meaning affect emotional responses and engagement in digital learning environments.

The literature synthesis presents consistent evidence that emotionally engaging design features, such as visual appeal, intuitive interaction, and personally relevant content, can enhance learner motivation and performance. However, there are inconsistencies in how key constructs are defined, the variation in emotional responses across cultures, and the application of methodological approaches across studies. For FGCS, the literature reveals a strong consensus that emotionally supportive design enhances learning by improving students' appraisals of control and value. At the same time, there is significant variation in how emotional design is understood and applied, both theoretically and methodologically. One of the most pressing gaps is the lack of studies that directly connect emotional design features to control-value appraisals, especially for diverse and historically underserved learner populations. Many existing studies rely on homogeneous samples and incorporate affective design strategies without grounding them in robust theoretical frameworks or considering the experiences of underrepresented groups.

This review establishes the rationale for the present study, which seeks to bridge that gap by combining CVT and Norman's emotional design framework to examine how specific design features influence perceived control, perceived value, and academic outcomes for FGCS in online learning environments.

Chapter 3: Research Method

The problem addressed in this study is a theoretical gap in linking emotional design (Norman, 2004) to perceived control-value appraisals defined by Control-Value Theory (CVT; Pekrun, 2006) and achievement in an online learning environment for first-generation students. Evidence suggests that emotional design, whether defined or undefined, has a significant impact on learning outcomes by influencing motivation, engagement, and cognitive processes (Bakir-Yalçin & Usluel, 2024; Beymer et al., 2023; Endres et al., 2020). Research grounded in CVT links positive emotions, such as enjoyment and interest, with performance achievement, while negative emotions, like boredom and frustration, hinder achievement (Camacho-Morles et al., 2021; Sharp et al., 2020). The purpose of this quantitative correlational study was to examine the relationship between an emotional design framework (Norman, 2004), focusing specifically on visceral, behavioral, and reflective levels, perceived control-value, and student achievement in online learning among first-generation postsecondary students in the United States. This study directly addresses the gap in understanding how emotional design influences learning outcomes for first-generation learners, using Control-Value Theory (CVT) as its guiding framework.

This chapter outlines the research methodology and design implemented for this study, including the population and sampling strategies, materials and instrumentation, operational definitions of variables, data collection procedures, methods of analysis, and a review of the study's assumptions, limitations, delimitations, and ethical assurances.

Research Methodology and Design

The research employed a quantitative correlational methodology using structural equation modeling (SEM) to test hypothesized relationships among three latent variables: emotional design, perceived control-value, and achievement. This methodology was intentionally selected to explore the theoretical and predictive relationships among emotional design, perceived control-value appraisals, and academic achievement in first-generation students enrolled in online courses. A quantitative method was best suited for this study because it aims to examine hypothesized relationships between latent constructs, specifically, the levels of emotional design (visceral, behavioral, reflective), perceived control-value, and achievement.

The issue identified in this study is the absence of an empirically validated framework linking emotional design (Norman, 2004) and Control-Value Theory (CVT) (Pekrun, 2006) within the context of online education for first-generation learners. The goal of this study was to assess the predictive strength and direction of the relationships between these inherently measurable constructs. The research questions explicitly called for measuring the extent to which emotional design principles predict control-value appraisals (RQ1) and how those appraisals predict student achievement (RQ2). Quantitative methodology enables the precise operationalization of these constructs using established psychometric instruments, allowing for the statistical testing of hypotheses across a large sample. Additionally, the latent nature of the variables involved (e.g., perceived control, engagement, emotional resonance) requires analytic tools that go beyond simple correlations or regressions.

The predictive correlational design facilitates the investigation of whether and how well independent constructs, such as emotional design and perceived control-value, predict the dependent outcome of academic achievement. Its purpose is not to manipulate variables but to

model and explain observed patterns and potential causal pathways among naturally occurring data within an educational context.

Several alternative approaches were considered but ultimately determined less suitable for addressing the problem, purpose, and research questions. A qualitative approach, such as phenomenology or grounded theory, could offer rich, descriptive insights into the emotional experiences of first-generation students in online learning environments. However, qualitative methods are exploratory and misaligned to test hypotheses or generalize findings across a population. Given that this study aimed to measure predictive relationships among defined psychological constructs and test a theory-based model, qualitative methods lacked the necessary analytic precision and generalizability. Additionally, while interviews or focus groups might provide depth, they would not allow for the simultaneous evaluation of multiple latent variables across a sufficiently large sample. They could also introduce subjectivity that could obscure the general patterns necessary to inform scalable design interventions.

A mixed-methods design, combining quantitative and qualitative approaches, was also considered. While potentially beneficial for triangulating findings or adding narrative depth, a mixed-methods approach would increase study complexity and participant burden without proportionate gains in answering the research questions. This study is grounded in testing a theoretical model using quantifiable indicators, and qualitative data would not substantially advance the understanding of predictive pathways beyond what SEM can offer. As such, mixed methods were not necessary for fulfilling the research purpose.

Another alternative considered was a true experimental design with control and treatment groups, one exposed to emotionally designed content and the other to a neutral design. While this approach might offer strong internal validity regarding causality, it poses ethical and practical

challenges. Random assignment of students to different course designs in an institutional setting could affect fairness, learner equity, and course quality assurance. Furthermore, the digital learning environments examined already include elements of emotional design, making it unfeasible to establish a pure control condition. Additionally, such designs often require long-term tracking and strict oversight of learning settings, which can be challenging to achieve in adult, asynchronous online programs. The primary objective of this study is not to test design features in isolation, but to evaluate their perceived effects within naturally occurring educational contexts.

Population and Sample

The target population for this study was adult first-generation college students (FGCS) who are currently enrolled in introductory-level online courses at a large, private U.S. postsecondary institution that specializes in career and skilled-trade programs. These learners are typically 25 years or older, balance work and family responsibilities, and complete their coursework exclusively through the institution's Brightspace learning-management system. Institutional enrollment reports indicate that several hundred students enroll in the required introductory course sequence each month, with over 50% qualifying as first-generation learners. This creates a large enough pool to meet the minimum sample size requirements outlined below.

The theoretical gap this study addresses centers on how design can strengthen control and value appraisals for learners who, due to their background, are most at risk of diminished agency and engagement. FGCS, therefore, offers a high-leverage context in which design-based interventions have the greatest potential impact. Key population traits include limited inter-generational academic capital, high financial stress, reduced perceived control and task value in

online coursework, and higher negative emotions like anxiety and frustration compared to continuing-generation peers (Cameron et al., 2023)

To determine the minimum sample size (*N*) that provides 80% power for a structural-equation model with three correlated latent factors, measured by seven observed indicators, an RMSEA-based power method was employed. First, the degrees of freedom are determined from df = (p (p+1) / 2)− t where $p = 7$ is the number of observed variables and t is the number of free parameters. With one loading per indicator (7), one residual variance per indicator (7), and three latent covariances (3), the three factor variances are fixed at 1 for scale identification, $t = 17$, so df = (7 (8) / 2) − 17 = 28−17=11. Using the Soper online SEM calculator that follows the computation procedure outlined in MacCallum et al. (1996), the recommendation is that a minimum of 360 participants is required to detect an RMSEA of .08 at the .05 significance level with 80% power when the true model has three latent constructs and seven indicators (Soper, 2025). In structural equation modeling, a parameter refers to any value estimated from the data, including factor loadings, variances, covariances, and regression paths. A commonly recommended guideline is to have at least 20 participants per estimated parameter to ensure model stability and reliable standard errors (Kline, 2015). In this study, the model includes an estimated 18 parameters, including six factor loadings, six measurement error variances, three latent variable variances, and three structural regression paths. Based on the 20:1 ratio, a minimum sample size of 360 participants is recommended to ensure stable estimation.

Participants self-identified as first-generation under the Higher Education Act (2023) definition, who were at least 18 years old, and actively enrolled in one of the institution's designated introductory online courses at the time of recruitment. Demographic metadata, including age range, gender, cultural background, and income band, was collected to allow for

post-hoc checks of sample representativeness and, if necessary, the introduction of control variables.

Sampling Technique

A non-probability convenience sample was drawn from the institution's learning platform enrollment lists. Convenience sampling is suitable because the study aims to test a theory rather than infer information about the entire population. The researcher obtained permission from gatekeepers to contact this closed learner population, and the accessible pool is large enough to satisfy power requirements without stratification. During the power analysis, fitting the null-hypothesized model (H_0) to covariances implied by the population model under the alternative hypothesis (H_1) removes sampling error (Jak et al., 2020).

The courses are part of two different, asynchronous, self-paced career programs with rolling weekly enrollment. To mitigate reliability threats, recruitment continued until the target sample size was reached. The sample was appropriate, as the inclusion criteria, first-generation learners enrolled in the emotionally designed course, align with the study's problem, purpose, and hypotheses. A power analysis confirms that N = 360 was sufficient to detect modest effect sizes ($\beta \approx .20$) with acceptable error rates and approaches the 20:1 case-to-parameter ratio needed for model stability.

Recruitment and Data-Access Procedures

Students were recruited from the first course in a career diploma program. The researcher embedded a personalized invitation via the institution's learner center to the target population that explains the study purpose, voluntary nature, eligibility criteria, incentive (entry into a drawing for one of five $500 digital gift cards), and a link to the informed-consent page hosted in Brightspace's D2L native survey tool. Students reviewed the consent document, self-verified

their first-generation status, and electronically indicated their agreement. Those who declined were thanked upon exit.

Participants who met the first-generation criteria and provided consent completed three validated instruments that measure emotional design levels (SAM, SUS, LES), along with the AEQ-S control and value sub-scales. When the learner finished the course, the final course grade percentage and next-term re-enrollment status were linked with survey responses using a secure student ID key; the analytic file contained only anonymized IDs.

Materials or Instrumentation

Three validated instruments operationalized visceral-behavioral-reflective levels of emotional design (Norman, 2004). Visceral level (ED1) was captured with the Self-Assessment Manikin (SAM) pictorial scale (Bradley & Lang, 1994). SAM has demonstrated internal-consistency coefficients ranging from $\alpha = .82$ to .90 and strong convergent validity with physiological indices of affect (Bradley & Lang, 1994). The SAM, developed by Lang (1980) and Hodes et al. (1985), is a nonverbal, pictorial tool used to measure emotional responses along the dimensions of pleasure, arousal, and dominance. Originally interactive and digital, it expanded to paper for group use and screenings (Bradley & Lang, 1994). Its graphics depict emotional states from happy to unhappy, excited to relaxed, and large to small figures for control (Bradley & Lang, 1994). SAM sought to address the limitations of the verbal Semantic Differential Scale (Bradley & Lang, 1994) by making it accessible across languages and populations, including children and individuals with aphasia. It has been effectively used in studies involving pictures, sounds, advertisements, pain, and clinical groups (Bradley & Lang, 1994).

Behavioral level (Norman, 2004) (ED2) was measured with the 10-item System Usability Scale (SUS) (Brooke, 1996). A meta-analysis of the SUS reported a mean reliability of $\alpha = .91$ and evidence of a stable two-factor structure (Lewis, 2018). SUS was developed in 1986 by Digital Equipment Corporation in Reading, UK, as a quick, reliable, and low-cost subjective usability measure for industrial evaluations (Brooke, 1996). It aims to provide a global system usability assessment and compare user performance across software versions. SUS has been widely used in research and industry, proven robust, reliable, and effective, and is available freely with acknowledgment required (Brooke, 1996).

The reflective level (ED3) was assessed using the Learning Engagement Scale (LES) (Hassan et al., 2020), which is derived from the Utrecht Work Engagement Scale for Students (UWES-S; Schaufeli et al., 2002). The LES exhibits composite reliabilities ranging from .86 to .93 and demonstrates factorial validity across higher education contexts (Hassan et al., 2020). The LES was developed to measure engagement across various stakeholders in business schools, including teachers, students, parents, and industry, by adapting existing validated instruments and creating new constructs where necessary (Hassan et al., 2020). Specifically, Hassan et al. developed a student engagement scale focusing solely on the "dedication" dimension to measure institutional engagement.

Control and value appraisals were measured with the Achievement Emotions Questionnaire – Short (AEQ-S) (Bieleke et al., 2021). Across multi-country samples, the AEQ-S yields Cronbach's alphas $\geq .80$ and invariance across gender and academic domains, supporting both reliability and construct validity (Macías León et al., 2022). The Achievement Emotions Questionnaire (AEQ), outlined by Pekrun et al. (2002) and updated in 2011, measures nine achievement emotions across various academic settings based on Control-Value Theory. It

assesses emotional experiences before, during, and after activities, covering affective, cognitive, motivational, and physiological components. Due to its length (232 items), researchers often shortened it, leading to inconsistent quality. The AEQ-S was developed as a shorter version with four items per scale, validated for reliability, and offers a practical alternative for studies with time constraints while maintaining the original theoretical foundation (Bieleke et al., 2021). Academic achievement was operationalized as final course percentages, and persistence was measured by learners' presence on the class list for the next course, extracted from the institution's learning management system (archived data). Grades offer an objective, interval-scaled outcome commonly used in predictive SEM studies of online learning. Persistence measures continued enrollment in the subsequent course (1 = persisted, 0 = withdrew), providing a binary nominal indicator of retention.

Operational Definitions of Variables

Emotional Design

Emotional Design (ED) is the exogenous, predictor construct. It is conceptualized as having three parts: latent visceral, behavioral, and reflective layers of design experience (Norman, 2004). The v*isceral level* was captured using the Self-Assessment Manikin (SAM) (Bradley & Lang, 1994). This nine-point pictorial scale yields separate ordinal ratings of valence and arousal and has demonstrated strong convergent validity with physiological indices of emotion as well as solid internal consistency in repeated psychometric work (Bradley & Lang, 1994). The b*ehavioral level* is indexed by the 10-item System Usability Scale (SUS) (Brooke, 1996). Raw Likert responses are recoded, summed, and multiplied by 2.5 to produce an interval-level composite ranging from 0 to 100. The r*eflective level* was assessed using the Learning Engagement Scale (LES) (Hassan et al., 2020). Items are averaged to yield either an overall

engagement mean or three parcels representing vigor, dedication, and absorption. In the SEM, the three indicators load onto a single latent emotional design (ED) factor, which predicts perceived control-value.

Perceived Control-Value (PCV)

Perceived control value functions as the mediating latent variable. Control and value appraisals was measured with the Achievement Emotions Questionnaire – Short (AEQ-S) (Bieleke et al., 2021). Respondents rate each item on a five-point Likert continuum; sub-scale means (interval level, 1–5) serve as two observed parcels, PCV-Control and PCV-Value. PCV is specified to mediate the pathway from ED to academic achievement.

Achievement (ACH)

Achievement is the criterion (endogenous) construct. It is modelled with two manifest indicators drawn from institutional records. Course grades were exported as final percentages and rescaled to proportions between 0 and 1, giving a ratio-level measure of performance. Persistence captures continued enrolment in the following sequential course (1 = persisted, 0 = withdrew), providing a binary nominal index of retention. Together, these two indicators form a latent ACH factor that allows the SEM to represent both performance and persistence outcomes.

Study Procedures

Survey deployment was carried out within the D2L Brightspace Learning Management System (LMS) using its native survey tool. The survey was embedded near the end of the course within the course module. This strategic placement allowed students to indicate their emotional state and reflect on their learning experience while actively engaged, thereby supporting more accurate self-reporting of their emotional and cognitive states. Participants were notified about the research study on the Brightspace Learning Management System. Additionally, notifications

were posted on the course homepage. These messages included the study's optional nature, its purpose, information about participation incentives, the researcher's contact details, and a direct link to the survey. Within the Brightspace survey functionality, students encountered an electronic informed consent form that explains the study's goals, estimated time to complete the survey, and guarantees of data confidentiality. Students indicated their consent by checking a box before proceeding to the survey.

Survey Content and Data Collection

The survey included the following components. Demographic items include a question about the potential subjects' parents' educational levels, indicating whether they are first-generation college students. Age, gender, and race/ethnicity were also collected. Additionally, the students' preferred email addresses were gathered to notify winners of incentives through a random draw. A validated Student ID was automatically collected to facilitate matching with institutional academic outcome data, such as final course grades and persistence.

The instruments used in this study comprise of the SAM (Bradley & Lang, 1994) to measure the visceral level of emotional design, the SUS (Brooke, 1996) to assess the behavioral level of design, the LES (Hassan et al., 2020) to evaluate the reflective level of design, and the AEQ-S (Bieleke et al., 2021) to assess perceived control and perceived value subscales.

Data management and security were prioritized. Survey results were exported via a high-permission-level report from Brightspace and securely stored in an institutionally approved cloud environment accessible only to authorized researchers. During analysis, identifiable data was de-identified and stored separately from the master ID key. Achievement and persistence data were matched post-course. Final grades expressed as percentages were retrieved and associated with survey records using student IDs. Additionally, persistence was recorded as a binary variable (1

= enrolled in a subsequent required course within 14 days, 0 = did not enroll) based on LMS enrollment data. Prior to data collection, the full study protocol, consent form, and instruments were submitted to the university's Institutional Review Board (IRB) for approval to ensure ethical compliance.

Data Analysis

To directly test $H1_a$ and $H2_a$, this study utilized structural equation modeling (SEM) to analyze and evaluate the relationships among emotional design principles, perceived control-value appraisals, and achievement outcomes among first-generation students. Structural Equation Modeling (SEM) was appropriate for this research for several reasons. First, SEM allows for the modeling of latent variables, such as emotional design, control-value appraisals, and achievement, based on multiple observed indicators. For instance, emotional design is measured through instruments, such as the SAM (Bradley & Lang, 1994), the SUS (Brooke, 1996), and the LES (Hassan et al., 2020), each capturing different aspects of emotional experience. Second, SEM enables the testing of complex, mediated relationships, including indirect effects of emotional design on achievement through control-value appraisals. This is essential because the theoretical framework (CVT) posits that emotions serve as mediators between environmental stimuli, like design features, and learning outcomes. Third, SEM offers a rigorous, theory-driven approach to model validation by utilizing fit indices, such as the Root Mean Square Error of Approximation (RMSEA), to assess the alignment of the relationships with actual data (MacCallum et al., 1996).

The methodology followed Kline's (2016) seven-step SEM procedure to ensure rigor. Defining the model was based on an Emotional Design framework (Norman, 2004) and Control-Value Theory (Pekrun, 2006). It included three latent constructs: Emotional Design (ED)

measured by three indicators: SAM (Bradley & Lang, 1994) to measure the visceral level, SUS (Brooke, 1996) to measure the behavioral level, and LES (Hassan et al., 2020) to measure the reflective level. Perceived control-value (PCV) was assessed with the AEQ-S (Bieleke et al., 2021), and Achievement (ACH) was operationalized through final course grades (interval scale) and persistence (binary nominal). Based on the hypotheses, the structural model proposes that emotional design (ED) predicts perceived control-value (PCV; H1a), which in turn predicts achievement (ACH; H2a). An indirect pathway from ED to ACH, mediated by PCV, was also tested. This structure was diagrammed using SPSS AMOS and redrawn in Figma for clarity.

The model was evaluated for identification by confirming that the ratio of knowns (observed variances/covariances) to unknowns (parameters to be estimated) met the minimum requirements for a just-identified or over-identified model. The latent constructs were each associated with multiple indicators, satisfying minimal conditions for model identification. Before proceeding with estimation, assumptions of multivariate normality, linearity, and absence of multicollinearity were evaluated. The model was estimated using Maximum Likelihood Estimation (MLE), the most common estimation method for SEM under assumptions of multivariate normality (Kline, 2015). Model parameters included factor loadings, error variances, structural path coefficients, and covariances. The estimation process was conducted in AMOS and was replicated in R (using lavaan) to confirm robustness.

Following Kline (2015), model fit was assessed using a combination of absolute, incremental, and parsimonious fit indices: Chi-square (χ^2), Root Mean Square Error of Approximation (RMSEA) with a target of $\leq .06$; Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), both with targets of $\geq .95$; and Standardized Root Mean Square Residual (SRMR),

with a target of ≤ .08. Additional diagnostics, such as residuals and modification indices, were examined to determine any necessary revisions.

If model fit is suboptimal, theory-driven modifications may be made. Modification indices were consulted to identify misfitting paths or covariances. Any changes were guided by theory and prior empirical findings, not solely by statistical criteria, to preserve model validity. Model interpretation involves several key steps once an adequate fit is established. First, the direct and indirect effects were analyzed: the strength and significance of the ED → PCV and PCV → ACH paths are examined to test hypotheses $H1_a$ and $H2_a$ directly. Additionally, mediation for the indirect ED → PCV → ACH path was assessed using bootstrapped confidence intervals to ensure robustness. For each structural path, standardized coefficients (β), standard errors, and p-values were reported to provide a comprehensive understanding of the relationships within the model.

To enhance generalizability, cross-validation was explored by randomly splitting the sample, if sufficiently large, and testing model invariance across subgroups (e.g., gender). Multi-group SEM may be used to examine the stability of path coefficients across subpopulations (Kline, 2015). This comprehensive SEM approach enabled rigorous testing of the hypothesized relationships, thereby addressing the core research question regarding how emotional design influences perceived control-value appraisals and achievement outcomes among first-generation online learners.

Assumptions

This study rests on several foundational assumptions. First, it is assumed that participants provided accurate and honest responses to all survey items. This is critical for the reliability of the data collected through the self-report instruments. Second, it is assumed that the instruments

used are valid and reliable for the target population, adult first-generation college students enrolled in online courses. The instruments selected have demonstrated psychometric robustness across similar educational contexts. Third, it is assumed that the data met the statistical assumptions required for structural equation modeling (SEM), including multivariate normality, linearity, and the absence of multicollinearity. Finally, it is assumed that participants understood and engaged with emotionally designed content in ways that reflect the constructs of Emotional Design (Norman, 2004) and Control-Value Theory (Pekrun, 2006), allowing the model to be tested meaningfully within the study context.

Limitations

Several limitations inherent to this study may influence the interpretation and generalizability of the results. The study utilizes a convenience sample from a single institution, which may limit the extent to which findings can be generalized to all first-generation students in online learning environments. Reliance on self-reported data introduces the potential for bias due to social desirability or inaccurate self-perception. The study design is correlational, and while structural equation modeling allows for testing of directional hypotheses and indirect pathways, it does not establish causality. Some variability in course implementation or prior learner experience with technology may influence responses, despite efforts to standardize the survey conditions.

To mitigate these limitations, the study employs validated instruments with demonstrated reliability, targets a large sample size to minimize sampling error, and incorporates multiple indicators per latent variable to enhance measurement precision. Additionally, reminders were issued uniformly, and no instructors were involved in recruitment to reduce coercion and social desirability effects.

Delimitations

This study is intentionally delimited in several ways. First, it focuses solely on adult learners who self-identify as first-generation college students, consistent with the study's goal of addressing motivational and emotional disparities among this high-risk group. Second, the sample is drawn exclusively from asynchronous online courses at a single private U.S. institution that offers career and trade programs. This delimits the study's context to adult online education rather than traditional or hybrid formats. Third, the study includes only three levels of emotional design: visceral, behavioral, and reflective, as defined by Norman (2004), and their relationship to perceived control-value and achievement, as outlined by Control-Value Theory (Pekrun, 2006). Other theoretical frameworks or aspects of design are beyond the scope.

These delimitations are justified by the study's purpose, which is to address a theoretical and empirical gap in understanding how emotional design affects the perceived control and value of first-generation learners, as well as their subsequent achievement outcomes in online learning environments. The selection of this population, setting, and theoretical framing align directly with the research questions, problem statement, and existing literature on emotion-driven design and motivational theory. By narrowing the focus, the study is positioned to make a meaningful contribution to both theoretical integration and practical instructional design for underserved learners.

Ethical Assurances

This study received formal approval from the University's Institutional Review Board (IRB) prior to any data collection, ensuring compliance with ethical research standards. The study presents minimal risk to participants. Nevertheless, all participants received a clear and thorough informed consent form outlining the voluntary nature of participation, the use of data,

the estimated time required, and the benefits and risks of participation, including the opportunity to be entered into a drawing for a digital gift card as an incentive.

Participant confidentiality was rigorously protected. Survey responses were collected through the institution's secure Brightspace LMS and stored on institutionally approved encrypted cloud servers accessible only to the researcher. A unique student ID was used to match survey data with academic outcomes (final grades and course persistence), and the file linking identities to data was stored separately and securely. After the analysis was complete, identifying information was deleted, and only de-identified data was retained for reporting and archival purposes.

The researcher serves as both the principal investigator and a professional within the online learning institution. While this role provides access to participants and systems, it also introduces potential bias. To mitigate this risk, the researcher was involved in course instruction or grading, and no personal relationships exist between the researcher and the participants. Recruitment communications were distributed via system-wide messaging platforms, and the survey process was fully automated to minimize perceived pressure or coercion. Finally, a copy of the IRB approval letter was included in the appendix of the completed dissertation manuscript.

Summary

This study aimed to address a theoretical gap by exploring how emotional design, conceptualized through Norman's (2004) visceral, behavioral, and reflective framework, influences first-generation college students' perceived control-value appraisals and academic achievement in online learning environments. Grounded in Control-Value Theory (CVT) (Pekrun, 2006), the research employed a quantitative predictive correlational design and used structural equation modeling (SEM) to test relationships among three latent constructs:

emotional design, perceived control-value, and achievement. Data was collected through validated instruments (SAM, SUS, LES, AEQ-S) and linked to institutional records of course grades and persistence.

Participants were adult first-generation students enrolled in introductory online courses at a large U.S. institution. The sample size of 360, justified above, ensures adequate power for SEM analysis. Ethical standards were upheld through IRB approval, data confidentiality safeguards, and mitigation of researcher bias. The study aims to offer insights into how emotional design can foster motivational and academic outcomes for a specific population.

Chapter 4: Findings

The problem addressed in this study was a theoretical gap in linking emotional design (Norman, 2004) to perceived control-value appraisals defined by Control-Value Theory (CVT; Pekrun, 2006), and to achievement in an online learning environment for first-generation students. The purpose of the quantitative correlational study was to examine the relationship between emotional design principles, specifically visceral, behavioral, and reflective levels, perceived control-value, and student achievement in online learning among first-generation postsecondary students in the United States.

Assumptions and Quality of the Data

The assumptions of the statistical test were as follows. Following the computation procedure outlined in MacCallum et al. (1996), an a priori power analysis using the Soper (2025) SEM sample size calculator indicated that a minimum of 360 participants was required to detect model misfit corresponding to RMSEA = .08 at $\alpha = .05$ with 80% power (Soper, 2025). 399 viable subjects were successfully recruited and met the criteria within the allotted time. Participants were required to be 18 years or older, identify as first-generation students, sign the

consent form, and complete the surveys to qualify. These criteria were clearly outlined in the recruitment materials and the consent form. Additionally, a first-generation status question was included at the end of the surveys to verify participants' status. Responses were treated as independent observations. The sample size was considered sufficient for stable estimation, given the model complexity and the estimator. Item-level missingness was 0. No outliers or influential cases were detected.

Because the emotion variables and final course grade were based on bounded Likert-type and proportion-based scales, multivariate normality was not assumed. Structural equation modeling was therefore conducted using maximum likelihood estimation with bootstrapped standard errors and confidence intervals to improve robustness to non-normality. Analyses were conducted using the R *lavaan* package. Bias-corrected bootstrapping with 2,000 resamples and 90% confidence intervals was used to estimate indirect effects of emotional design on academic achievement through the achievement emotion variables. This approach provided more reliable inference for indirect effects and parameter estimates under non-normal data conditions than conventional normal-theory standard errors.

Validity and Reliability of the Data

Four established instruments were used to operationalize emotional design levels (visceral, behavioral, reflective) and achievement emotions. Prior validity evidence is summarized below, along with internal consistency reliability from the present sample where applicable.

Self-Assessment Manikin (SAM)

Visceral affect was measured using the Self-Assessment Manikin (SAM), a nonverbal pictorial measure of valence (pleasure), arousal, and dominance (Bradley & Lang, 1994).

Convergent validity has been demonstrated via strong correspondence between SAM ratings and pleasure and arousal factors derived from longer semantic differential methods, with correlations ranging from r = .96–.97 for pleasure and r =.94–.95 for arousal (Bradley & Lang, 1994). Because SAM dimensions are single-item ratings, internal consistency reliability is not applicable.

System Usability Scale (SUS)

Behavioral-level emotional design was measured with the 10-item System Usability Scale (SUS; Brooke, 1996). Evidence supports primarily unidimensional measurement and concurrent validity through associations with other usability measures and task success (Bangor et al., 2008; Lewis, 2018). Prior large-scale work reports strong internal consistency with α = .911 (Bangor et al., 2008).

Learner Engagement Scale (LES; Engagement subscale)

Reflective-level emotional design was measured using the student engagement subscale derived from the Learner Engagement Scale (LES; Hassan et al., 2020). Construct validity evidence is supported by convergent validity such as factor loadings above common thresholds and acceptable SEM fit indices as reported by Hassan et al. 2020. Prior work reports strong internal consistency with α = .88–.96 (Hassan et al., 2020).

Achievement Emotions Questionnaire–Short Form (AEQ-S)

Discrete achievement emotions were measured with the AEQ-S (Bieleke et al., 2021). The AEQ-S retains the original scale's content coverage by selecting items to measure affective, cognitive, motivational, and physiological components of each emotion (Bieleke et al., 2021). Validity evidence includes strong correspondence with full AEQ scale scores, r = .88–.96 across emotions/settings (Bieleke et al., 2021). Reported subscale reliability of the AEQ-S is

satisfactory for research with α =.63–.84 (Bieleke et al., 2021). A summary of reliability estimates (Cronbach's α) for this study is shown in Table 1.

Table 1

Internal Consistency Reliability for Study Measure

Measure / Subscale	α	Standardized α
LES (Total)	.723	.783
SUS (Total)	.827	.833
AEQ-S		
Enjoyment	.908	.911
Hope	.937	.938
Pride	.945	.947
Relief	.863	.864
Anger	.949	.952
Anxiety	.938	.940
Shame	.952	.954
Hopelessness	.965	.965
Boredom	.953	.954

Note. N = 399. Internal consistency was acceptable to excellent across measures. Reliability was acceptable for the LES (α = .723; standardized α = .783), good for the SUS (α = .827; standardized α = .833), and excellent for all AEQ-S emotion subscales (αs = .863–.965

Results

The analytic sample included N = 399 first-generation adult learners who completed the demographic items and were retained for analysis. Table 2 summarizes the demographic data.

Table 2

Demographic Summary Data

Characteristic	Category	n	%
Race/Ethnicity	White	284	71.2
	Hispanic or Latino/a/x	54	13.5
	Black or African American	23	5.8
	Asian	9	2.3
	American Indian or Alaska Native	7	1.8
	Another race or ethnicity	2	0.5
	Native Hawaiian or Other Pacific Islander	1	0.3
	Prefer not to say	11	2.8
Annual household income	Less than $25,000	70	17.5
	$25,000–$49,999	152	38.1
	$50,000–$74,999	73	18.3
	$75,000–$99,999	34	8.5
	$100,000 or more	19	4.8
	Prefer not to report	47	11.8
Gender	Female	375	94.0
	Male	14	3.5
	Non-binary or third gender	6	1.5
	Prefer not to say	4	1.0
First-generation status	Parent/guardian education: some college (no degree) OR high school diploma/GED (or less)	399	100.0

Note. Participant Demographics (N = 399)

Descriptive statistics and Pearson correlations were computed using IBM SPSS Statistics (Version 30.0.0). Descriptive statistics and reliability analyses were computed for all study measures, followed by structural equation modeling (SEM) to evaluate the hypothesized direct and indirect relationships among emotional design, achievement emotions, and academic achievement.

To address multicollinearity and align with Norman's (2004) theoretical framework, emotional design (ED) was modeled as a latent construct comprising visceral, behavioral, and reflective levels. This latent factor was indicated by the Self-Assessment Manikin (SAM; visceral level), the System Usability Scale (SUS; behavioral level), and the Learner Experience Scale (LES; reflective level), respectively, allowing shared variance to be modeled directly while accounting for measurement error.

Achievement emotions were assessed using the Achievement Emotions Questionnaire–Short Form (AEQ-S). Responses were recorded on a 1–5 Likert scale and averaged to compute scale scores for each discrete emotion. Academic achievement was operationalized using final course grade (FinalGrade). Persistence was also measured as a binary outcome (0 = did not persist, 1 = did persist); however, due to the highly imbalanced distribution, limited variability of this indicator, and analysis tool constraints, persistence was not included in the final structural model.

Confirmatory factor analyses and structural equation modeling were conducted in R using the *lavaan* package, with maximum likelihood estimation and bias-corrected bootstrapping. A confirmatory factor analysis (CFA) was conducted to evaluate the measurement properties of emotional design (ED) and perceived control–value (PCV). All factor loadings were statistically significant ($p < .001$). The estimated latent covariance between ED and PCV

was 0.443; given the estimated latent variances for ED (0.463) and PCV (0.426), this corresponded to an implied latent correlation of approximately .998, indicating a lack of discriminant validity between the two constructs in this sample. As a result, PCV was not retained as a distinct latent construct in the final structural model.

To further reduce multicollinearity among achievement emotion indicators while preserving Control–Value Theory–aligned emotional distinctions, discrete AEQ-S emotion scales were aggregated into observed emotion composites for subsequent modeling. Discrete emotion scores were computed as the mean of the items for each emotion. Composite emotion variables were then computed as the mean of constituent emotion scores: positive activating emotions (enjoyment, hope, pride), negative activating emotions (anxiety, anger, shame), and negative deactivating emotions (hopelessness, boredom). Relief was retained as a single observed indicator representing positive deactivating emotions. Descriptive statistics for all study variables are presented in Table 3, and bivariate Pearson correlations among emotional design, the emotion composites, and final course grade are presented in Table 4.

Table 3

Descriptive Statistics for Emotional Design, Achievement Emotions, and Final Grade

	Minimum	Maximum	Mean	Std. Deviation
ED_Visceral	1.00	9.00	7.11	1.742
ED_Behavioral	20.00	100.00	83.56	14.93
ED_Reflective	.00	5.00	4.03	.637
Positive Activation	1.47	5.00	4.1509	.65426
Positive Deactivation	1.00	5.00	3.8001	1.04078
Negative Activation	1.00	4.94	1.6849	.81175
Negative Deactivation	1.00	5.00	1.5337	.81983
Final Grade	.4541	1.0000	.957401	.0526311

Note. N = 399.

Table 4

Pearson Correlations Among Study Variables

	ED Visceral	ED Behavioral	ED Reflective	PosAct	PosDeact	NegAct	NegDeact	Final Grade
ED Visceral	1	.252**	.241**	.372**	.116*	-.208**	-.216**	.029
ED Behavioral	.252**	1	.400**	.480**	.132**	-.610**	-.630**	.183**
ED Reflective	.241**	.400**	1	.614**	.262**	-.261**	-.339**	.148**
PosAct	.372**	.480**	.614**	1	.311**	-.458**	-.472**	-.043
PosDeact	.116*	.132**	.262**	.311**	1	.067	-.024	.029
NegAct	-.208**	-.610**	-.261**	-.458**	.067	1	.909**	-.203**
NegDeact	-.216**	-.630**	-.339**	-.472**	-.024	.909**	1	-.172**
Final Grade	.029	.183**	.148**	-.043	.029	-.203**	-.172**	1

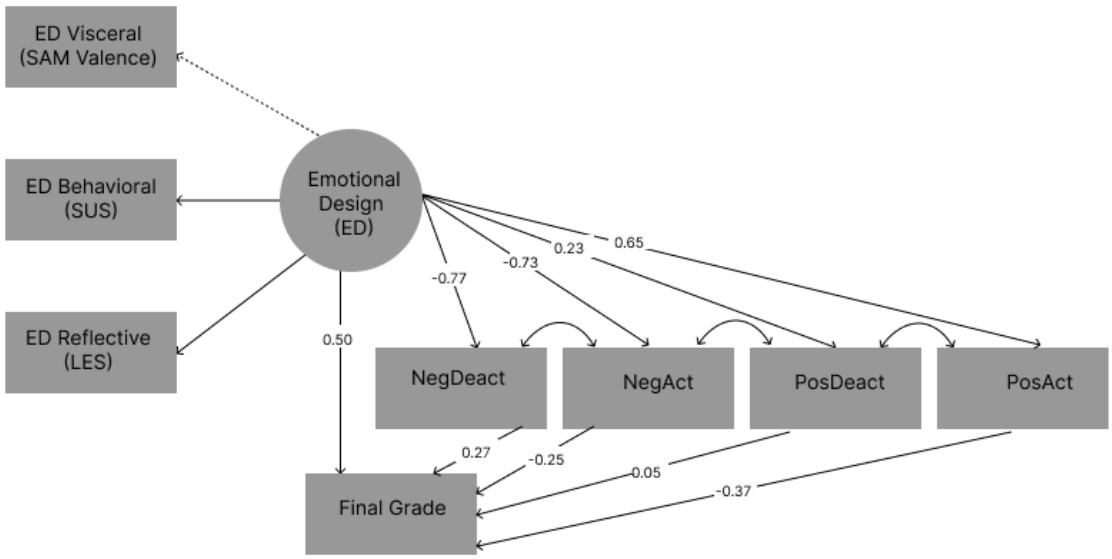
Note. N = 399. ** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

Emotional Design Predicting Achievement Emotions

A structural equation model was estimated using the full sample of first-generation learners (N = 399). To address the first research question, emotional design was specified as a predictor of four achievement emotion composites (positive activating, positive deactivating, negative activating, and negative deactivating emotions), which in turn were specified as predictors of final course grade. A direct path from emotional design to achievement was also included.

Figure 1

Structural path from Emotional Design to Achievement via Achievement Emotions



Note. ED = Emotional Design; SAM = Self-Assessment Manikin; SUS = System Usability Scale; LES = Learning Engagement Scale; NegAct = Negative Activating

Before evaluating the structural relations among emotional design, achievement emotions, and academic achievement, the measurement properties of the emotional design construct were examined. Emotional design was specified as a latent variable reflecting Norman's visceral, behavioral, and reflective levels of experience, indicated by SAM Valence, the System Usability Scale (SUS), and the Learner Experience Scale (LES), respectively. Table 5 presents the standardized factor loadings for the emotional design measurement model. All indicators loaded significantly on the latent construct, supporting the adequacy of the

measurement model and the use of emotional design as a latent predictor in the structural analyses.

Table 5

Measurement Model: Emotional Design

Indicator	Standardized Loading (λ)	SE	p
SAM Valence (Visceral)	.35	—	—
SUS (Behavioral)	.78	.18	< .001
LES (Reflective)	.52	.12	< .001

Note. Emotional design was modeled as a latent construct indicated by visceral, behavioral, and reflective components. SAM Valence was fixed to 1.00 for model identification; standardized loadings are reported.

Consistent with theory and empirical diagnostics, a small number of theory-consistent residual covariances were specified among the emotion variables and between engagement and positive activating emotions to account for shared variance not attributable to emotional design.

Table 6

Residual Covariances

Variables	Standardized Covariance	p
PosAct ↔ PosDeact	.18	.002
NegAct ↔ NegDeact	.80	< .001
PosDeact ↔ NegAct	.37	< .001
PosDeact ↔ NegDeact	.24	< .001
LES ↔ PosAct	.41	.001

Note. Residual covariances were specified to account for shared variance not explained by emotional design.

The model residual-based fit was *CFI* = .96, *SRMR* = .05, and *RMSEA* = .12, 90% CI [.09, .14]. Emotional design significantly predicted all four achievement emotion variables. Higher levels of emotional design were associated with higher positive activating emotions (β = .65, p < .001) and higher positive deactivating emotions (β = .23, p = .003), as well as lower negative activating emotions (β = −.73, p < .001) and lower negative deactivating emotions (β = −.77, p < .001).

Achievement Emotions Predicting Academic Achievement and Indirect Effects

To address the second research question, final course grade was regressed simultaneously on emotional design and the four achievement emotion variables. Positive activating emotions were significantly and negatively associated with final course grade (β = −.37, p = .004). Negative activating emotions demonstrated a marginal negative association with course grade (β = −.25, p = .052). In contrast, positive deactivating emotion (relief) was not significantly related to achievement (β = .05, p = .331), and negative deactivating emotions showed a marginal positive association with course grade (β = .27, p = .065). Emotional design retained a significant positive direct effect on academic achievement (β = .50, p = .013).

Indirect effects were evaluated using bias-corrected bootstrapping with 2,000 resamples and 90% confidence intervals. The specific indirect effect of emotional design on final course grade through positive activating emotions was statistically significant (β = −.24, 90% BC CI [−1.99, −0.27]). Indirect effects through positive deactivating emotions (β = .01, 90% BC CI [−0.05, 0.14]), negative activating emotions (β = .19, 90% BC CI [−0.03, 1.47]), and negative deactivating emotions (β = −.21, 90% BC CI [−1.76, 0.02]) were not statistically significant. The total indirect effect across all four emotion composites was not statistically significant (β = −.25, 90% BC CI [−2.45, 0.07]). Indirect pathways are summarized in Table 7.

Table 7

Standardized Specific Indirect Effects of Emotional Design on Final Grade

Indirect path	Specific indirect (β)	90% BC CI
ED → PosAct → FinalGrade	-0.239	[-1.986, -0.268]
ED → PosDeact → FinalGrade	0.012	[−0.048, 0.137]
ED → NegAct → FinalGrade	0.186	[−0.031, 1.467]
ED→ NegDeact → FinalGrade	-0.206	[−1.755, 0.023]
ED→ (all mediators) →FinalGrade	-0.247	[−2.454, 0.067]

Note. Values represent standardized indirect effects of emotional design (ED) on final course grade through each achievement emotion composite. Indirect effects were estimated using bias-corrected bootstrapping with 2,000 resamples and 90% confidence intervals.

Comparison of Results to the Literature Review

RQ1: Emotional design and achievement emotions

In the present study, higher emotional design (ED) was positively associated with higher positive activating emotions (enjoyment, hope, pride) and lower negative activating emotions (shame, anxiety, anger). Emotional design was also associated with lower negative deactivating emotions (hopelessness and boredom) and a small increase in relief ($\beta = .23$, $p < .001$). These findings align with prior research, which emphasizes that emotionally supportive design features can reduce perceived strain and support more adaptive emotional experiences in online educational environments. Endres et al. (2019) reported that warm visuals, friendly narration, and narrative framing can reduce extraneous cognitive load and self-regulation demands, which is consistent with the observed pattern of fewer negative emotions as emotional design increased.

Cui et al. (2024) found that interest, autonomy support, and enthusiasm are associated with lower boredom, aligning with the association between emotional design and lower boredom/hopelessness observed in the present study. Beymer et al. (2020) similarly linked emotional design reflective-level supports such as meaning-making and connections to prior knowledge and emotional design behavioral-level supports (active participation) to more positive emotions and lower boredom and frustration, while also noting that design may influence emotions both through control–value-related pathways and through more direct affective routes. The present results are compatible with either pathway insofar as emotional design was consistently associated with multiple achievement emotions.

RQ2: Emotional Design, Achievement Emotions, and Achievement

The present study both confirmed and diverged from aspects of this prior work. In this investigation, achievement (final course grade) was modeled as a predicted outcome of emotional design and four categories of achievement emotions within a single structural model. Results indicated that emotional design was directly associated with achievement. This aligns with Goldman et al. (2024), who found that emotions affect academic achievement: positive emotions such as enjoyment and pride boost motivation and success, while negative emotions such as shame, hopelessness, anger, and disappointment hinder progress by dampening motivation or causing distraction. Bakır-Yalçın and Usluel (2024) similarly concluded that positive achievement emotions influence achievement in online learning, whereas negative achievement emotions can hinder achievement.

In contrast, the emotion variables explained a smaller share of performance differences and did not follow a uniform positive relationship. Specifically, positive activating emotions

were not associated with higher grades in the expected direction, and the association between negative deactivating emotions and grades was weaker and, in some cases, non-significant. This pattern partially aligns with earlier research. Consistent with Bakır-Yalçın and Usluel (2024), negative emotions tended to correspond with poorer outcomes, reinforcing the general importance of reducing negative affect in online learning. However, the findings diverge from their conclusion that positive activating emotions such as enjoyment, hope, and pride reliably support achievement through engagement. With respect to boredom and other deactivating emotions, the results align with prior studies, which note that boredom–achievement relationships are often inconsistent or modest and may depend on learners' expectancy and value beliefs (Berweger et al., 2022; Sharp, 2018). Cui et al. (2024) reported that boredom is closely tied to perceptions of interest and autonomy support, stating that emotional design and contextual factors may shape achievement indirectly through situational conditions, even when the statistical association between deactivating emotions and grades is small in a given model.

Summary

This section presents results from a quantitative correlational study examining relationships among emotional design, achievement emotions, and academic achievement in an online learning context among first-generation postsecondary students. Analyses were conducted using an analytic sample of N = 399. Descriptive statistics and reliability estimates were computed for all study measures, and bivariate correlations were examined among emotional design, the emotion composite variables, and final course grade. Structural equation modeling was then used to evaluate direct and indirect relationships, with maximum likelihood estimation and bootstrapping procedures used to address non-normality and to estimate indirect effects.

Results indicated that emotional design was significantly associated with each of the four composite emotion variables, with higher emotional design predicting higher positive emotions and lower negative emotions. Emotional design also retained a significant positive direct association with final course grade. Activating emotions were generally associated with lower academic achievement, with positive activating emotions showing a significant negative relationship with final course grade and negative activating emotions demonstrating a marginally negative association. In contrast, deactivating emotions were not significantly related or showed marginal positive associations with achievement, while emotional design maintained a significant positive direct effect on course grade. Among the testing indirect pathways, a statistically significant specific indirect effect was observed through positive activating emotions; however, the total indirect effect across emotional variables was not significant. The next section considers implications and limitations of this research as well as directions for future research.

Chapter 5: Implications, Recommendations, and Conclusions

Introduction

The problem to be addressed in this study is a theoretical gap in linking emotional design (Norman, 2004) to perceived control-value appraisals defined by Control-Value Theory (CVT; Pekrun, 2006) and achievement in an online learning environment for first-generation students. Although emotional design has been examined in prior research, less is known about how a structured emotional design framework grounded in Norman's (2004) visceral, behavioral, and reflective levels operates in relation to Control–Value Theory (CVT). The purpose of this quantitative, correlational study was to examine the relationship between an emotional design

framework, perceived control-value, and student achievement in online learning among first-generation postsecondary students in the United States.

The study employed structural equation modeling (SEM) using survey data and final course grades from first-generation adult learners enrolled in the first course of a postsecondary online career program. Emotional design was operationalized using Norman's (2004) three-level (visceral, behavioral, reflective) framework, assessed through the Self-Assessment Manikin (SAM) (Bradley & Lang, 1994), the System Usability Scale (SUS) (Brooke, 1996), and the Learner Engagement Scale (LES) (Hassan et al., 2020) respectively. Achievement emotions were measured using the Achievement Emotions Questionnaire (AEQ-S) (Bieleke et al., 2021), and academic achievement was operationalized as final course grade. Overall, this study found that emotional design predicted emotions and achievement but was empirically indistinguishable from control-value appraisals. Consequently, emotional design functioned as an integrated appraisal system.

This chapter presents the implications of these findings, how the findings support or diverge from the current literature, organized by research question. Implications are followed by recommendations for practice, recommendations for future research, and concluding thoughts.

Implications

Research Question 1: Emotional Design and Control–Value Appraisals

Research Question 1 examined whether emotional design (visceral, behavioral, and reflective levels) predicted first-generation students' perceived control–value appraisals in an online learning environment. Although the hypotheses tested for a significant predictive relationship, the findings indicated that emotional design and perceived control–value appraisals were empirically indistinguishable in this sample. Measurement modeling revealed substantial

conceptual and statistical overlap between perceived control–value indicators and emotional design indicators. The two primary relationships that showed overlap were behavioral design (usability and perceived control) and reflective design (meaning and engagement). This overlap necessitated the removal of perceived control–value appraisals as a separate latent construct in the final structural model.

Theoretical Implications. Overall, emotional design emerged as a strong, multidimensional predictor of achievement emotions and academic achievement. Several factors influenced the interpretation of these results. Methodologically, RMSEA showed a less favorable absolute fit, but this should be considered alongside its known limitations. Conversely, the Comparative Fit Index (CFI) indicated good relative fit, meaning the model significantly improved over the independence model and captured key structural relationships. Recent methodological work cautions against rigid reliance on traditional fit index cutoffs. Lai and Green (2016) highlight that widely accepted thresholds (e.g., RMSEA $\leq .08$, CFI $\geq .95$) are mostly heuristic, lack a precise theoretical basis for "good fit," and should not be considered definitive if the indices disagree. Similarly, McNeish (2023) states that widely adopted cutoff values, based on simulations assuming continuous data, perform poorly in models with discrete values, such as Likert-scale data frequently used in psychological research. RMSEA tends to overestimate misfit in models with low degrees of freedom, highly correlated latent variables, mediation, residual covariances, and restricted outcome variance, all of which are present here. This combination makes the chi-square statistic overly sensitive, leads to unstable standardized estimates, and inflates RMSEA values, suggesting that the fit discrepancy is driven by limitations of the index rather than true problems with the model itself.

The present study findings suggest a contextual nuance in how Control–Value Theory operates within emotionally designed online learning environments. Rather than operating solely as a contextual antecedent that indirectly shapes achievement emotions through distinct control and value appraisals, emotional design appeared to function as an embedded appraisal structure within this online learning context. Design features aligned with Norman's visceral, behavioral, and reflective levels appeared to integrate control and value cues directly into learners' experiences, making appraisal empirically inseparable as a distinct cognitive stage. This suggests that, in digitally mediated environments, contextual design may serve as the structural embodiment of control and value rather than merely an external influence.

This study also advances emotional design as a theoretically coherent construct. By operationalizing emotional design through Norman's multilevel framework, the research moves beyond fragmented aesthetic manipulations and toward a structured, replicable model. Positioning emotional design within Control–Value Theory clarifies how specific design features map onto motivational processes, strengthening its conceptual precision and supporting cumulative, theory-driven inquiry in online learning research.

Consistency and Divergence With Prior Research. The present findings both diverge from and extend prior research on control–value theory (CVT) and emotional design. Consistent with CVT, achievement emotions were strongly associated with academic outcomes, aligning with meta-analytic evidence linking enjoyment positively and boredom negatively to performance (Camacho-Morles et al., 2021). This study also aligns with research that shows that control and value appraisals predict achievement emotions and engagement in learning environments (Bakır-Yalçın & Usluel, 2024; Pekrun, 2024). This interpretation is further supported by emotional design research showing that aesthetic and anthropomorphic features can

enhance motivation and learning outcomes while sometimes increasing perceived cognitive load (Wong & Adesope, 2021; Skulmowski & Xu, 2022). The present study findings concur that design features do more than decorate content; they shape learners' motivational orientation. The results extend this body of literature by demonstrating that when emotional design is modeled coherently across visceral, behavioral, and reflective levels, it can function as an integrated motivational system rather than a discrete intervention layered on top of instruction.

The results diverge from prior mediation-based findings, which suggest that features of the learning environments influence achievement emotions indirectly through distinct control and value appraisals (Beymer et al., 2023). Emotional design and perceived control–value appraisals demonstrated an extremely high positive correlation ($r = .998$), indicating near-complete shared variance and a lack of discriminant validity. Given this level of overlap, the constructs were not empirically distinguishable as separate latent factors within this sample. This finding may reflect substantive conceptual overlap, measurement similarity, or contextual integration within emotionally designed online environments. Rather than functioning as a sequential pathway (design → appraisal → emotion), emotional design functioned as an integrated representation of learners' experiences of control and value. This experiential integration is conceptually coherent. Behavioral design features (e.g., usability, clarity, navigational predictability) communicate competence and controllability, while reflective design features (e.g., relevance, meaning, identity alignment) communicate value. When design elements consistently signal both manageability and personal significance, learners may not experience "appraisal" as a separate cognitive evaluation; instead, control and value become embedded properties of the learning environment itself. In this sense, emotional design may operate not merely as an antecedent to appraisal, but as its structural embodiment.

Contextual and Population-Specific Implications. The findings may be particularly relevant for first-generation adult learners, whose educational experiences are often shaped by competing responsibilities and heightened sensitivity to environmental cues. Prior research suggests that this population demonstrates stronger coupling between affective signals and motivational meaning (Goldman et al., 2024). In such contexts, emotionally supportive design features may simultaneously reinforce perceptions of relevance and competence, contributing to stable motivational orientations.

First-generation adult learners frequently balance work, caregiving, and time constraints, making clarity, predictability, and efficiency especially salient features of online learning environments. When course structures are transparent and useful, perceptions of control and value may be implicitly supported by design coherence rather than explicit cognitive evaluation (Goldman et al., 2024). In this way, emotional design may play a stabilizing role in sustaining engagement and persistence, even when achievement outcomes are not directly mediated by discrete appraisal measures.

At a societal level, a probable implication is that structured emotional design can support more equitable and emotionally responsive online learning environments for first-generation students, potentially improving engagement, persistence, and well-being. An improbable implication would be assuming that emotional design alone can guarantee achievement gains across all learning contexts.

Research Question 2: Appraisals, Achievement Emotions, and Academic Performance

Research Question 2 examined the extent to which perceived control–value appraisals predict first-generation students' achievement in an emotionally designed online learning environment. Control–Value Theory (CVT) posits that perceived control and value predict

achievement indirectly by influencing achievement emotions (Pekrun, 2006). Empirical support for this theory is reinforced in the literature. Shao et al. (2020) demonstrated that control and value appraisals predicted foreign language performance both directly and indirectly through positive and negative achievement emotions. Similarly, Camacho-Morles et al. (2021) reported consistent meta-analytic evidence linking enjoyment positively and boredom negatively to academic achievement. Bakır-Yalçın and Usluel (2024) further confirmed that control and task value significantly predicted engagement in online learning environments, largely through emotional pathways. The present findings partially converge with this body of research. Consistent with CVT, negative activating emotions showed a marginal negative association with achievement, aligning with prior evidence linking anxiety and frustration to attentional disruption and performance decrements (Pekrun et al., 2011; Camacho-Morles et al., 2021). This pattern reinforces CVT's key claim that high-arousal negative emotions undermine performance when perceived control is insufficient.

Divergence From Traditional Mediation Models. The present research study diverges from traditional CVT mediation patterns in two important ways. First, in contrast to studies such as Shao et al. (2020), which demonstrated additive and interactive effects of control and value on performance, the current findings suggest that, in emotionally designed online environments, appraisal processes may be structurally embedded in the design rather than functioning as separable predictors. Second, the association between positive activating emotions and achievement was unexpectedly negative. This diverges from the moderate positive relationships reported in meta-analytic research (Camacho-Morles et al., 2021) and from structural models demonstrating performance-enhancing effects of enjoyment and pride (Shao et al., 2020; Pekrun et al., 2017).

Although meta-analytic research often reports positive associations between activating emotions and achievement, the literature also reflects variability across task structures and situational contexts. CVT posits that the effects of achievement emotions influence performance through cognitive, motivational, and task mechanisms, not just emotional valence (Pekrun, 2006). Positive and negative emotions have variable effects depending on task demands and context (Pekrun, 2006). In performance environments characterized by procedural completion, competency thresholds, or limited grade variability, high enjoyment may reflect ease or efficiency rather than meaningful engagement. This interpretation is supported by boredom research showing that deactivating emotions do not uniformly predict lower performance. Sharp et al. (2020) found that boredom can coexist with adequate achievement, particularly in low-novelty contexts. Similarly, Schwartze et al. (2024) demonstrated that boredom may arise from under-challenge among high-performing students. The marginal positive association between negative deactivating emotions and achievement in the present study is therefore not inconsistent with emerging evidence that emotional valence alone does not determine performance outcomes.

Direct Effects of Emotional Design on Academic Achievement. This study also found a strong direct association between emotional design and achievement, aligning with research emphasizing course quality, system usability, and environmental supports as direct predictors of persistence and performance in online higher education. Rahmani et al. (2024) identified course quality, system attributes, and learner motivation as primary determinants of online success and dropout risk. The present findings suggest that structured emotional design may function as a performance-relevant contextual variable independent of emotional mediation, particularly in adult online populations. These results propose a contextual refinement of CVT in online learning environments. Rather than operating strictly through a sequential pathway (appraisal →

emotion → achievement), emotionally structured online environments may exert direct effects on achievement while simultaneously shaping emotional experience. For first-generation adult learners who often balance competing demands and prioritize efficiency, performance may depend more strongly on environmental clarity, usability, and relevance than on discrete emotional states.

Recommendations for Practice

Based on the findings, several practice-oriented recommendations are justified. First, learning designers and institutions could adopt structured emotional design frameworks grounded in Norman's (2004) visceral, behavioral, and reflective levels. Emotional design demonstrated strong internal coherence and a direct positive relationship with academic achievement, indicating that usability, clarity, and meaning are core instructional features rather than aesthetic enhancements. Second, emotionally supportive design should be treated as foundational in online programs serving first-generation learners. Clear navigation, predictable workflows, and meaningful contextual framing may reduce emotional strain and support persistence, consistent with CVT and prior emotional design research (Endres et al., 2020). Finally, practitioners should avoid assuming that positive emotions uniformly enhance achievement. Instead, emotional design should support functional emotional experiences aligned with task demands and learner goals, consistent with CVT's situational perspective.

Recommendations for Future Research

Future research should continue to investigate the role of emotional design in online learning environments to further clarify its influence on learners' motivational processes and academic outcomes. Specifically, additional studies are recommended that explicitly examine the impact of emotional design, as conceptualized by Norman's (2004) visceral, behavioral, and

reflective framework, on learner motivation alongside academic achievement. While prior research has established links between emotional design, affective responses, and performance, further empirical work is needed to model motivation as a central mechanism through which emotional design may influence learning outcomes.

In addition, future studies should extend this line of inquiry to diverse learner populations and comparative contexts. Research involving different demographic groups, institutional types, or learner profiles, such as traditional versus adult learners, first-generation versus continuing-generation students, or learners across varying levels of prior academic preparation, would help determine whether the relationships among emotional design, emotional appraisals, and achievement differ across populations. Comparative studies may reveal meaningful variance in how learners perceive and respond to emotionally designed learning environments, thereby enhancing the generalizability of findings.

A final recommendation is that longitudinal, program-stage–specific research be conducted to examine how these relationships evolve over time. Studies that assess learners at different points within an academic program (e.g., early, middle, and late stages) may provide insight into how temporal factors, including cumulative academic experiences or historical demotivation, influence the strength and direction of relationships among emotional design, emotional appraisals, and achievement. Understanding how emotional design functions across time could inform more adaptive and developmentally responsive instructional design strategies.

Conclusions

This study makes a theoretical contribution by reframing emotional design as a contextual appraisal mechanism within Control–Value Theory (CVT). The finding that emotional design and perceived control–value appraisals were statistically indistinguishable

challenges traditional sequential mediation models and suggests that, in digitally mediated settings, design may function as the structural embodiment of control and value rather than merely an antecedent to appraisal.

The study also establishes emotional design as a coherent, multilevel construct by modeling Norman's visceral, behavioral, and reflective dimensions as a unified latent factor. Emotional design demonstrated meaningful predictive power, with behavioral usability emerging as the strongest contributor, underscoring the importance of clarity and navigability for adult online learners. Emotional design also directly predicted academic achievement even after accounting for achievement emotions, indicating that it influences performance through both affective and instructional mechanisms. The findings further refine emotion–achievement relationships by highlighting their context sensitivity, particularly in adult online environments. By integrating CVT with emotional design theory among first-generation adult learners, this research advances theory, strengthens construct operationalization, and positions emotional design as a core, equity-relevant principle of online instructional practice.

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Appendix A: Permissions

Instrument Permissions

The assessment involves multiple levels. At the visceral level (ED1), the Self-Assessment Manikin (SAM) (Bradley & Lang, 1994) is used as stated in the documentation as open for use for non-commercial research and educational purposes The behavioral level (ED2) is evaluated using the System Usability Scale (SUS) (Brooke, 1996), with permission for research stated in the publication. The reflective level (ED3) is measured using the Learning Engagement Scale (LES) (Hassan et al., 2020), with written permission to use the LES granted from Dr. Hassan, the principal investigator. Perceived Control-Value (PCV) is gauged with the Achievement Emotions Questionnaire – Short (AEQ-S) (Bieleke et al., 2021). The AEQ-S is licensed under a Creative Commons Attribution 4.0 International License, allowing anyone to share and adapt it for any purpose without needing permission from the authors, provided appropriate credit is given.

Appendix B: Recruitment Script

My name is Cynthia Lewis, and I am a doctoral student at National University as well as the Director of Product Experience here at Penn Foster. I am conducting this online survey to explore how the design of online learning environments influences students' emotions, motivation, and achievement. The name of this research is "Emotional Design and First-Generation Learners: Predicting Control-Value Appraisals and Achievement in Online Learning Environments."

To participate, you must:

- Be 18 years or older
- Be currently enrolled in *DNT001: Introduction to Dental Assistant*
- Identify as a first-generation college student, meaning neither of your parents or guardians has completed a college degree

The survey will ask about your experiences in this course, including your reactions to the design, ease of use, relevance, engagement, and motivation. You will also be asked some basic demographic questions, such as your age, gender, cultural background, and income band. With your consent, I will also access your final course grade and whether you continue to the next course. The survey should take about 10–15 minutes to complete.

There are minimal foreseeable risks or discomforts associated with this research. You can still skip any question you do not wish to answer or stop participation at any time. Your participation in this study is voluntary, and your responses will be kept confidential. While your survey responses will be linked to your academic record (course grades and enrollment status) for research purposes, no identifying information will appear in any reports or publications.

I will keep the records of this study private and take reasonable measures to protect the security of all your personal information. In any report I make public, I will not include any information that will make it possible to identify you. All data will be stored securely, and only my faculty advisor and I will have access. Participation will not affect your grades or your standing at Penn Foster. If you participate, there are no direct benefits to you. This research may increase the body of knowledge in the subject area of this research.

Upon completing the survey, you will have the option to enter a drawing for one of five $200 digital gift cards. There is a 1.5% chance you will win a gift card. If you choose to enter, you will provide your email address on a separate form; this information will not be linked to your survey responses.

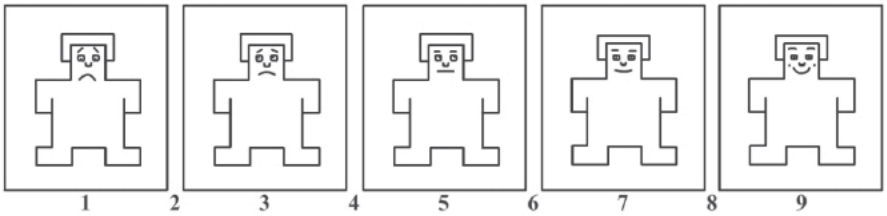
For questions about your rights as a participant in this research, or to report any research-related concerns, you may contact the National University Institutional Review Board (IRB) at **irb@nu.edu**

If you have questions about this survey, you may contact me at **C.Lewis0270@o365.ncu.edu**

I have read the above information and have received answers to any questions I asked. I consent to take part in the study.

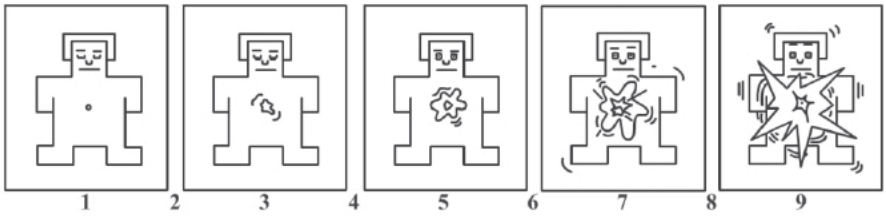
Appendix C: Self-Assessment Manikin (SAM) Instrument

How unpleasant or pleasant do you feel right now?



- 1 (unpleasant)
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9 (pleasant)

How calm or excited do you feel right now?



- 1 (calm)
- 2
- 3
- 4
- 5
- 6
- 7
- 8

- 9 (excited)

Appendix D: System Usability Scale (SUS) Instrument

Please respond to all items by using the rating scale 1 (Strongly disagree) to 5 (Strongly agree).

I think that I would like to use the online course frequently.

I found this online course unnecessarily complex.

I thought this online course was easy to use.

I needed the support of a technical person to be able to use this online course.

I found the various functions in this online course well integrated.

I thought there was too much inconsistency in this online course.

I would imagine that most people would learn to use this online course very quickly.

I found this online course very cumbersome to use.

I felt very confident using this online course.

Appendix E: Learning Engagement Scale (LES) Instrument

Please respond to all items by using the rating scale 1 (Strongly disagree) to 5 (Strongly agree).

To me, my studies are challenging.

My studies inspire me.

I am enthusiastic about my studies.

I am proud of my studies.

I find my studies full of meaning and purpose.

Appendix F: Achievement Emotions Questionnaire – Short (AEQ-S)

Achievement Emotions Questionnaire

This next section will ask you about your feelings related to this course (DNT001: Introduction to Dental Assistant). Please respond to all items by using the rating scales with five categories: 1 (Strongly disagree) to 5 (Strongly agree).

Class-related Emotions

Courses can bring out different emotions. The next questions are about how you usually feel in *this course*. Before you answer, think about some of the typical moments you've had here—like reading

lessons, doing activities, or working on assignments. Please tell us how you generally feel when you're going through the materials. Read each statement carefully and choose the answer that best matches your experience.

I enjoy being in class.

I look forward to learning a lot in this class.

I am motivated to go to this class because it's exciting.

I enjoy participating so much that I get energized.

I am confident when I go to class.

I am full of hope.

I am confident because I understand the material.

Being confident that I will understand the material motivates me.

I am proud of myself.

I think that I can be proud of what i know about this subject.

Because I take pride in my accomplishments in this course, I am motivated to continue.

When I do well in class, my heart throbs with pride.

I am angry.

When I think of the time I waste in class I get aggravated.

I wish I didn't have to login to class because it makes me angry.

I feel anger welling up in me.

I feel nervous in class.

Even before I login to class, I worry whether I will be able to understand the material.

Because I'm so nervous, I would rather skip logging into class.

I get tense in class.

I get embarrassed.

When I do anything in class I feel like I am making a fool out of myself.

After I have done something in class I wish I could crawl into a hole and hide.

Because I get embarrassed, I become tense and inhibited.

I feel hopeless.

I've lost all hope in understanding this class.

Because I've given up, I don't have energy to go to class.

I feel so hopeless all my energy is depleted.

I get bored.

The class bores me.

I think about what else I might be doing rather than sitting in this boring class.

I get restless because I can't wait for the class to end.

Learning-related Emotions

Studying for your courses can induce different feelings. The following questions refer to emotions you may experience when studying for this course. Before answering the questions, please recall some typical situations of studying for the Milestones or for the Capstone which you have experienced. Read each statement carefully and respond using the scale provided.

I enjoy the challenge of learning the material.

I enjoy dealing with the course material.

I am so happy about the progress I made that I am motivated to continue studying.

When my studies are going well, it gives me a rush.

I am confident when studying.

I feel confident that I will be able to master the material.

I feel optimistic that I will make good progress at studying.

My sense of confidence motivates me.

I'm proud of myself.

I think I can be proud of my accomplishments at studying.

Because I want to be proud of my accomplishments, I am very motivated.

When I excel at my work, I swell with pride.

Studying makes me irritated.

I get annoyed about having to study.

I get so angry I feel like throwing my study materials out of the window.

When I sit at my desk for a long time, my irritation makes me restless.

I get tense and nervous while studying.

I worry whether I'm able to cope with all of my work.

While studying, I feel like distracting myself in order to reduce my anxiety.:

Worry about not completing the material makes me sweat.

I feel ashamed.

I feel shame when I realize that I lack ability.

Because I have had so much trouble with the course material, I avoid discussing it.

When somebody notices how little I understand I avoid eye contact.

When feel helpless.

I'm resigned to the fact that I don't have the capacity to master this material.

I feel so helpless that I can't give my studies my full efforts.

My lack of confidence makes me exhausted before I even start.

Studying for my courses bores me.

The material is so boring that I find myself daydreaming.

I would rather put off this boring work till tomorrow.

While studying I seem to drift off because it's so boring.

Test Related Emotions

Tests and exams can bring out many different feelings. The next questions are about the emotions you may experience when taking tests in *this course*. Before you begin, think back to typical situations when you took a Milestone or Capstone assessment. Please read each statement carefully and choose the response that best reflects how you usually feel in those moments.

I enjoy taking the exam.

For me the test is a challenge that is enjoyable.

Because I enjoy preparing for the test, I'm motivated to do more than is necessary.

Before taking the exam, I sense a feeling of eagerness.

I am optimistic that everything will work out fine.

I am very confident.

I think about my exam optimistically.

My confidence motivates me to prepare well.

I am proud of myself.

I'm proud of how well I mastered the exam.

Pride in my knowledge fuels my efforts in doing the test.

After the exam I feel ten feet taller because I'm so proud.

After the exam I feel relief.

After the exam I am freed.

After the exam the tension in my stomach is dissipated.

After the exam I finally can breathe easy again.

I get angry.

I get angry about the grading standards.

I wish I could tell someone off.

My anger makes the blood rush to my head.

I am very nervous.

I worry whether the test will be too difficult.

I get so nervous I wish I could just skip the exam.

At the beginning of the test, my heart starts pounding.

I feel ashamed.

I get embarrassed because I can't answer the questions correctly.

I get so embarrassed, I want to run and hide.

Because I am ashamed my pulse races.

I feel hopeless.

I start to think that no matter how hard I try I won't succeed on the test.

I feel like giving up.

I feel so resigned that I have no energy.