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Mind-It. Introducing Mindfulness Online to Help Students Change Perceptions and Develop Interest: A Design-Based Research Approach

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MIND-IT. INTRODUCING MINDFULNESS ONLINE TO HELP STUDENTS

CHANGE PERCEPTIONS AND DEVELOP INTEREST:

A DESIGN-BASED RESEARCH APPROACH

by

Joana M. Franco

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Instructional Technology and Learning Sciences

Approved:

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UTAH STATE UNIVERSITY
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ABSTRACT

Mind-It. Introducing Mindfulness Online to Help Students Change Perceptions and

Develop Interest: A Design-Based Research Approach

by

Joana M. Franco, Doctor of Philosophy

Utah State University, 2020

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Following contemporary educational perspectives that suggest learning should

take a holistic approach and aim to support students' whole being to integrate a more

conscious society, this study proposed to investigate ways to help higher education

students change their perceptions and develop interest in mindfulness meditation. Studies

have shown that mindfulness meditation—defined as training the ability to be present to

life experiences with acceptance and nonjudgment—help students in responding

skillfully to internal and external conditions and establishing life balance. Through a

design-based research approach, the purpose of this study was to iteratively design an

introductory online course—*Mind-IT*—that aimed to help students change perpective

about practicing mindfulness meditation and develop situational interest, with the

eventual goal of facilitating students' sustained interest in incorporating mindfulness

meditation in their lives. This was accomplished by first examining students' enablers

and barriers for engaging with mindfulness meditation, measured through an online

survey that informed the design of *Mind-IT*. Second, through user experience design

methods, such as benchmarking mindfulness apps and testing usability of *Mind-IT*, the design was refined. Lastly, the course was piloted to examine students' learning experiences leading to change in perception and situational interest development in mindfulness meditation. Participants for this study were drawn from the School of Veterinary Medicine since nationally research has identified this population as at-risk academically due to high levels of anxiety and depression. Results from the study showed that *Mind-IT* helped students explore and shift their concept and experience of mindfulness meditation, but would need to offer more support for behavior change. Findings also showed that *Mind-IT* helped students develop situational interest in mindfulness meditation, although excessive and unexpected effort and time spent on some learning activities became frustrating and hindered the development of situational interest for some students.

<div align="right">(270 pages)</div>

PUBLIC ABSTRACT

Mind-It. Introducing Mindfulness Online to Help Students Change Perceptions and

Develop Interest: A Design-Based Research Approach

Joana M. Franco

This study aligns with contemporary perspectives on higher education suggesting that

learning ought to be holistic, going beyond disciplinary knowledge and seeing students as

whole beings, to support them in knowing themselves and integrating a more conscious

society. In the attempt to contribute to this vision, this study advocates for incorporating

mindfulness meditation—a contemplative practice to train the ability to be fully aware of

the present moment with a nonjudgmental and curious attitude—into higher education

curriculum. Adopting design-based research, I created and iteratively refined a two-week

online course called *Mind-IT* to introduce mindfulness meditation to graduate students in

the Veterinary Medicine. Due to potential barriers to engage in mindfulness meditation,

the main goal of the study was to help students change their perceptions of mindfulness

and develop situational interest in practicing it for their well-being. Results showed that

Mind-IT helped students explore and shift their concept and experience of mindfulness,

but need to offer more support for behavior change. Findings also showed that although

excessive effort and time spent on some learning activities led to some frustration, *Mind-

IT* helped students develop situational interest in mindfulness meditation.

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Lastly, I feel great appreciation for the students in the Veterinary Medicine that participated in my study. I have learned from your stories and perspectives and I feel honored to have worked with you.

Joana Franco

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DEFINITIONS

Change or *Shift* in this study determines the extent to which learning can be defined as transformative (Imel & Russ-Gordon, 2010). That is, when adult learners deliberately identify and question prior beliefs and assumptions, change is the outcome of how much these learning experiences impact the learner's worldview, ways of being, and/or behavior (Taylor, 2008). Hoggan's (2016) typology suggested that change may occur in three main dimensions: concept, experience, and interaction.

Contemplative Pedagogy refers to educational methods and practices that focus on supporting other aspects of students' growth beyond content learning (Zajonc, 2013). This type of pedagogy has been adopted by a group of academics in higher education, especially influenced by the Center for Contemplative Mind in Society, to promote a more holistic learning that supports emotional intelligence, prosocial behaviors such as empathy and compassion, among other human qualities (Byrnes, 2012). One practice used in this pedagogy is mindfulness meditation (Barbezat & Bush, 2013b; Baugher & Bach, 2015).

Disorienting Dilemma could be a critical or dramatic event in a person's life that leads to questioning and sense making, according to the transformative learning theory (Taylor, 2008). It could also come from gradual, cumulative events (Cranton, 2006) that are less dramatic but still somewhat disorienting, such as daily stressful situations, unexpected enlightening conversation, or even exposure to a book or painting (Mezirow, 1991). These events serve as motivation for exploration and change—a desire to integrate or resolve the dilemma (Christie, Carey, Robertson, & Grainger, 2015; Tosey & Mathison, 2009).

Engagement in this study is defined as directed attention to performing a learning task (Schraw & Lehman, 2001). When learners focus their attentional resources on an activity, they indicate some level of interest in (Renninger & Hidi, 2011) and openness (Hoggan, 2016) to learning specific content.

Four-Phase Model of Interest Development describes interest development and its mechanisms in four stages. Interest develops over time and positive experiences of engagement with content from a (1) triggered situational interest to a (2) maintained situational interest. As personal connection with the content evolves, situational interest becomes an (3) emergent individual interest that matures into a (4) well-developed individual interest (Hidi & Renninger, 2006; Renninger & Hidi, 2011, 2016). *Situational Interest* refers to the initial two of four phases of interest development, when interest is fleeting and dependent on environmental conditions for activation (Schraw & Lehman, 2001). Situational interest may be triggered when the learner's attention is sparked by an aspect of the learning content or task, arousing cognitive and affective resources, and maintained when the learner forges meaningful connections and has prompted opportunities to reengage with the content (Harackiewicz, Smith, & Priniski, 2016; Hidi, Renninger, & Krapp, 2004a; Linnenbrink-Garcia et al., 2010). *Individual Interest* refers to the later two of four phases of interest development, when interest is personal and more stable and learners are predisposed to reengage with the content, depending less on external triggers (Hidi & Renninger, 2006; Linnenbrink-Garcia et al., 2010). Individual interest can be emergent or well developed.

Holistic Learning is defined here as integrating and facilitating multiple ways of knowing beyond the cognitive, including somatic or embodied, emotional, and relational

learning, which are integral to the theories of transformative learning (Beer et al., 2015; Burrows, 2015; Byrnes, 2012; Carter, 2002; Davis-Manigaulte, Yorks, & Kasl, 2006; Dirkx, 2006; Duerr et al., 2003; Laros, Fuhr, & Taylor, 2017; Morgan, 2015).

Mindfulness Meditation is defined in this study as a secular form of contemplative practice that trains bringing full attention—intentional presence of heart and mind (Shapiro, Thakur, & de Sousa, 2014)—to the moment-to-moment experience with an attitude of curiosity, non-judgment, and acceptance (Baer, 2003; Germer & Barnhofer, 2017; Kabat-Zinn, 2015; Robinson, 2004; Shapiro, Carlson, Astin, & Freedman, 2006). As individuals deliberately practice this type of meditation, they develop a quality of awareness called mindfulness or an ability to be mindful (Young, 2016).

Openness in this study refers to reduced resistance or increased willingness to explore alternative worldviews, so that a person's assumptions, experiences, and/or behaviors may shift (Cranton & Taylor, 2012; Hoggan, 2016; Sable, 2010; E. W. Taylor, 2008). This openness or willingness to engage may also be interpreted in this study as a triggered situational interest (Hidi & Renninger, 2006; Renninger & Hidi, 2011, 2016).

Transformative Learning Theory is a constructivist theory of specifically adult learning that derived from processes of communication (Habermas, 1971; Mezirow, 1991) and focused on how adults make meaning of their experiences and change perspectives. The theory has evolved from this cognitive focus on perspective transformation to include other ways of knowing and changing, such as emotional, somatic, and relational (Cranton & Taylor, 2012; E. W. Taylor, 2008). Hoggan's (2016, p. 77) proposed definition of transformative learning is that it "refers to processes that

result in significant and irreversible changes in the way a person experiences,

conceptualises and interacts with the world."

      Value refers to a positive feeling or perception associated with a learning task or

content. In this study, value is defined as intrinsic when it arises from the enjoyment of

learning; it is called utility value when it comes from recognizing the usefulness or

relevance of that task or content, particularly for one's goal attainment (Harackiewicz,

Tibbetts, Canning, & Hyde, 2014).

CHAPTER I

INTRODUCTION

Contemporary learning perspectives suggest that twenty-first century education should take a more holistic approach (Barbezat & Bush, 2013b; Palmer, Zajonc, & Scribner, 2010; Robinson, 2004). This means that education should go beyond a disciplinary focus and aim to integrate individuals in a more sustainable and conscious society (O'Sullivan, 1999; Taylor, 2011). Contemplative education is an approach to learning that seeks to embody this holistic view (Roeser & Peck, 2009; Schonert-Reichl & Roeser, 2016). Zajonc (2013) indicates that contemplative pedagogy aims to foster qualities such as "attention, emotional balance, empathetic connection, compassion, and altruistic behavior, while also providing new pedagogical techniques that support creativity and the learning of course content" (p. 83).

Among the practices of contemplative education, mindfulness meditation has gained a great amount of attention over the last few years in educational settings. Mindfulness meditation has been described as training nonjudgmental and intentional attention to the present moment (Kabat-Zinn et al., 1992). Studies have shown that it can contribute to enhancing individuals' focused attention (MacLean et al., 2010; Moore, Gruber, Derose, & Malinowski, 2012; Tang et al., 2007), well-being (Danitz, Suvak, & Orsillo, 2016; Thomson, 2011; Wisner, 2014), self-regulatory skills (Anderson, Lau, Segal, & Bishop, 2007; Evans, Baer, & Segerstrom, 2009; Norman, 2017), empathy (Shapiro & Walsh, 2003; Tan, Lo, & Macrae, 2014; Wisner, 2014), resilience (Galante et al., 2018; Siegel, Siegel, & Parker, 2016), and academic performance (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013). These are some of the outcomes that make learning

mindfulness meditation valuable for all students. In fact, recent research has suggested that mindfulness meditation should be incorporated in schools as a regular part of the curriculum (Barbezat & Bush, 2013b; Bonifas & Napoli, 2014; Bush, 2011; Meiklejohn et al., 2012; Napoli, Krech, & Holley, 2005; Sanger, Thierry, & Dorjee, 2018).

Efforts to integrate mindfulness meditation into the higher education curriculum need to consider both the context of learning mindfulness and the context of learning in higher education. First, for individuals to learn and develop the skill of sustaining non-judgmental attention in the present moment, they need deliberate practice. That is, mindfulness meditation requires effort and consistent practice (Bodhi, 2011; Creswell, 2017), which may happen if there is a driving motivation (Salomon & Globerson, 1987) such as interest (Hidi, 1990). Second, because of the nature of US higher education, students choose to pursue specific subjects as they build their major, leading choices around which courses to take to be deeply associated with what is valued within each field of expertise (Weidman, 1989; Weidman, Twale, & Stein, 2001). That is, if a topic is not perceived as relevant or valuable within the disciplinary culture, students are less likely to choose to learn it deliberately, as part of their formal studies.

Problem Statement

Implementing mindfulness meditation is difficult in higher education, as curricula still largely focuses on helping students build domain expertise (Bridges, 2000; Davidson, 2019). These structural constraints imply that mindfulness meditation in higher education must rely heavily on students' individual interest to deliberatly practice, since mindfulness is typically not a required subject within disciplinary contexts and requires

consistent practice for skill development. Moreover, the ways in which mindfulness meditation has been introduced into higher education (e.g., isolated initiatives in the classroom, research studies, or counseling services) may be restricted to small groups of students or highlight only one outcome of mindfulness (e.g., stress reduction), which may further contribute to persistent barriers among students toward consistently practicing mindfulness meditation (Eisenberg, Speer, & Hunt, 2012; Hunt & Eisenberg, 2010; Rizer, Fagan, Kilmon, & Rath, 2016; Vogel, Wade, & Hackler, 2007).

Therefore, the purpose of this dissertation is to investigate ways to help higher education students overcome potential barriers to practicing mindfulness meditation and develop their situational interest (grounded in a four-phase model of interest development I explain in Chapter II), with the eventual goal of helping them cultivate a sustained interest in incorporating mindfulness meditation in their lives. I will accomplish this by first examining students' barriers to practicing mindfulness meditation, and then testing and refining the design of the introductory module of an online course intended to help higher education students learn mindfulness through contemplation and critical reflection (Cranton, 2006; Mezirow, 1987, 1991), as well as foster interest development in practicing mindfulness meditation (Hidi & Renninger, 2006; Renninger & Hidi, 2016).

Goal and Objectives

This study will use a design-based research (DBR) approach to create and iteratively refine an online learning module designed for higher education students to examine their perspectives about and develop interest in mindfulness meditation. The module will introduce the topic and be part of a larger online course to help students learn mindfulness meditation, which will be developed in future research. The purpose of this

study is, first, to investigate students' assumptions that might represent either facilitators or barriers to practicing mindfulness meditation. Second, informed by these data and by theory, this study aims to examine the extent to which the design of an online module to introduce a mindfulness learning course—*Mind-IT*—facilitates students' perspective exploration and promotes situational interest in practicing mindfulness meditation.

Research Questions

To accomplish the goal and objectives described above, the research questions guiding this study are as follows:

1) What preconceived perceptions do higher education students have of mindfulness meditation?

2) What features in an online environment can foster individuals' engagement with mindfulness meditation?

Findings addressing these questions helped inform the development of the online module that introduced the mindfulness course, *Mind-IT*, to help students' perspective exploration of and situational interest development in mindfulness meditation. This then led to the third research question:

3) To what extent do learning experiences with *Mind-IT* help participants change their perceptions of mindfulness as well as develop situational interest in the practice? This question is examined in two parts:

   a) To what extent do the learning experiences with *Mind-IT* help participants explore and change perceptions about mindfulness meditation?

   b) To what extent do the learning experiences with *Mind-IT* help participants develop situational interest in mindfulness meditation?

Significance of Study

The literature review describes the importance of mindfulness meditation for higher education and some of the barriers to engagement among students, considering especially the ways it has been implemented. This study suggests that mindfulness meditation should not be offered exclusively to a sample of students, but rather that all students could benefit from learning it. Furthermore, this study focuses on facilitating students' perspective change and interest development so that engagement with mindfulness meditation can become autonomous and lifelong. Therefore, the significance of this study lies in incorporating mindfulness meditation in higher education to help students examine their assumptions and develop interest in engaging with the practice. In addition, by designing a learning environment grounded in a theoretical foundation and implemented it in a real-world context, this study contributes to advancing theory about transformative learning and interest development (described in Chapter II).

Summary

Mindfulness meditation is a practice that could be incorporated into the higher education curriculum to support students' learning and well-being. However, the ways that mindfulness meditation is currently brought into university settings are limited by being made available as either isolated pedagogy, a counseling service, or part of research studies. What is more, due to structural contraints, for students in higher education to engage with mindfulness meditation, there is a need for interest development and transformative learning. By understanding and then reducing potential barriers and

developing situational interest, this study aims to help students explore their perceptions and cultivate a sustained interest in incorporating mindfulness meditation in their lives.

Dissertation Outline

This dissertation study follows the traditional monographic format bounded by three cycles of design-based research methodology. The eight chapters include introduction, review of literature and theory, description of the research and course design, findings from each design-based iteration, and discussion and conclusions.

In Chapter I, I provide the background and reason for the study. I define the problem, goal and objectives, guiding research questions, and importance of the study. In Chapter II, I give an synthesized overview of the ways mindfulness meditation has been introduced in higher education and describe the constraints on students' engagement with mindfulness meditation. The literature review paves the way for the theoretical framework of the study, where I propose integrating transformative learning theory and the four-phase model of interest development as a foundation for desiging the online course, named *Mind-IT*. In Chapter III, I describe the research design of the study—Design-Based Research (DBR)—and lay out the three cycles of data collection and analysis that inform the design iterations of *Mind-IT*. I also describe participants and the setting of the study and delineate ethical considerations and methods for ensuring trustworthiness. In Chapter IV, I report the results from the first cycle of DBR, guided by the first research question identifying possible barriers and enablers to engaging with mindfulness meditation among a sample of the population. I describe the methods for data collection and analysis in this specific phase and illustrate the first iteration of the

design of *Mind-IT* informed by these results. In Chapter V, I report the findings from the

second cycle of DBR, guided by the second research question exploring design

functionalities and testing the usability of *Mind-IT* with another sample of the population.

I describe the methods for data collection and analysis used in this specific phase and

illustrate the second iteration of the design of *Mind-IT* informed by these results. In

Chapter VI, I describe the design of *Mind-IT*, laying out the sequence and describing each

of the activities in the two-week online course to be piloted in the last DBR cycle

planned. In Chapter VII, I report the findings from the third cycle of DBR, guided by the

third research question investigating learning experiences with *Mind-IT* with yet another

sample of the same population. I describe the methods for data collection and analysis

used in this specific phase and illustrate the last iteration of the design of *Mind-IT*

informed by these results. Finally, in Chapter VIII, I discuss the findings of the study in

light of the proposed integrated theoretical framework and prior literature described in

Chapter II. I also include in this chapter the contributions to design and theory, the

limitations of the study, recommendations for future research, and concluding thoughts

linking back to the background introduced in Chapter I.

CHAPTER II

LITERATURE REVIEW & THEORETICAL FRAMEWORK

Mindfulness is a secular form of meditation whose ultimate outcome is a certain quality of awareness (Germer & Barnhofer, 2017; Kabat-Zinn, 2015; Robinson, 2004) that aids individuals in being more conscious of themselves (Purser & Loy, 2013; Thompson, 2017) and responding more skillfully to life conditions (Bishop et al., 2004). Different from what the word suggests, the root meaning of the word mindfulness is presence of heart and mind (Shapiro et al., 2014), which can be translated into bringing full attention to the experience of the present moment with an attitude that is both mental and deeply embodied, allowing openness and curiosity as well as nonjudgment and acceptance of what is present.

Mindfulness meditation has recently taken the stage in the scientific world, most notably as a stress-reduction technique (Kabat-Zinn et al., 1992). Although an outcome of mindfulness meditation can be a more relaxed state of mind and body, mindfulness is not considered a relaxation practice (Bishop et al., 2004; Kabat-Zinn, 2012; J. M. G. Williams & Kabat-Zinn, 2011). Rather, mindfulness meditation is a type of mental training that is rooted in the moment-to-moment observation of any stimuli, whether internal or external, with openness and without judgment (Baer, 2003; Shapiro et al., 2006). Along these lines, Shapiro et al. (2006) suggested a model of mindfulness that encompasses three axioms: intention, attention, and attitude. Bishop et al. (2004) indicated that mindfulness practices "reduce cognitive vulnerability to reactive modes of mind that might otherwise heighten stress and emotional distress" (p. 231).

Mindfulness is both a practice (i.e., mental training through meditative processes) and a skill that develops through its practice (i.e., mindful attention or open awareness), which can lead to a decrease in falling back on perharps unproductive mental habits or conditioned, automated thoughts and behaviors (Barbezat & Bush, 2013b; Lebois et al., 2015; Shapiro et al., 2006). That is, developing mindfulness enables a shift in perspective and relationship to present experience in which the individual becomes less reactive and more able to just notice and step out of conditioned patterns (K. W. Brown, Ryan, & Creswell, 2007; Teasdale, 2004). Shapiro and colleagues (2006) named this perspective shift *reperceiving* and suggested that this natural human developmental process of disidentification with the contents of one's consciousness (e.g., thoughts and emotions) is fostered by mindfulness meditation. In their words, "through this change in perspective, identity begins to shift from the contents of awareness to awareness itself" (p. 379).

Engagement with Mindfulness Meditation in Higher Education

Initiatives that have brought mindfulness meditation into higher education have taken a few different shapes: some scholars have introduced mindfulness meditation by adopting a contemplative pedagogy in their own courses (de Bruin, Meppelink, & Bögels, 2015; Haight, 2010; Sarath, 2003); others have introduced mindfulness meditation by conducting scientific research to study it (Danitz et al., 2016; Mapel, 2012; Ramsburg & Youmans, 2014; Schwind et al., 2017); and some institutions have introduced mindfulness meditation by offering it as a resource for students' wellness through counseling services (Daltry, 2015; Kurash & Schaul, 2006; Murphy, 2006; Wyner, 2015).

Contemplative pedagogy has used a variety of practices, including mindfulness meditation, to allow a more holistic approach to education where first-person reflections complement third-person learning (Bush, 2011; Ergas, 2015; Repetti, 2010). This means that students are encouraged to contemplate and make meaning of their experiences subjectively in addition to building their objective, analytical abilities. The contemplative pedagogy of teaching and learning from a mindfulness perspective has tremendous value for incorporating the practice into universities. However, most initiatives are associated with an isolated course (Bush, 2011), rather than being an institutional approach. Thus, they might not necessarily lead students to appropriate mindfulness practices in their daily lives or even other academic activities.

Another way mindfulness has been introduced into higher education settings has been through research studies in which students voluntarily participate as subjects. Studies have investigated the influence of mindfulness-based practices on different learners' outcomes, such as stress and depression reduction (Danitz et al., 2016; Lynch, Gander, Nahar, Kohls, & Walach, 2018), attention and memory (Bennett, Egan, Cook, Mantzios, & Mantzios, 2018; Mrazek et al., 2013), and well-being (K. W. Brown & Ryan, 2003; Shapiro, Oman, Thoresen, Plante, & Flinders, 2008). Studies of mindfulness meditation are not necessarily associated with curriculum and might be limited to supporting only a few students within a certain period, since interventional studies typically occur in a contained time frame with only a small sample of a population.

Additionally, higher education has incorporated mindfulness-based therapy as a resource for students through counseling services within an institution (Daltry, 2015; Kurash & Schaul, 2006; Murphy, 2006; Preddy, McIndoo, & Hopko, 2013). In some

cases in which a preventive approach to mental health care is adopted, mindfulness

meditation is offered through technology-based self-help modules (Cavanagh et al., 2013;

Cavanagh, Strauss, Forder, & Jones, 2014; Conley, Durlak, Shapiro, Kirsch, & Zahniser,

2016; Levin, Haeger, Pierce, & Twohig, 2016). However, research has shown that on

average a third of the students drop out of these interventions (Cavanagh et al., 2014),

which indicates that engagement with the content is an issue (Banerjee, 2016; Levin,

Hayes, Pistorello, & Seeley, 2016). Moreover, mindfulness meditation in these conditions

is presented as a psychological treatment, narrowed to an association with mental illness

rather than a skill that any student can develop for both better learning and overall well-

being. This approach might reinforce some of the barriers to general students'

engagement because of their preconceptions about seeking psychological help (Martin,

2010; Vogel et al., 2007), or simply because they do not identify themselves as part of the

population targeted by mindfulness meditation.

Additionally, individuals may have barriers to engaging with mindfulness

meditation (Williams, Dixon, McCorkle, & Van Ness, 2011). Some of these barriers

result from a lack of knowledge about or interest in mindfulness (Gryffin, Chen, &

Erenguc, 2014; Rietschel, 2016; Rizer et al., 2016), or the way interventions are

structured in terms of time commitment (Bork, 2017; Forbes, Gutierrez, & Johnson,

2018). Other barriers might arise from assumptions, beliefs, and worries students might

have associated with meditation (Banerjee, Cavanagh, & Strauss, 2017; Bork, 2017;

Gryffin et al., 2014). In trying to capture reasons for low enrollment and high attrition in

health studies involving novices in meditation, Williams and colleagues (2011)

developed and validated an instrument to assess individuals' barriers (see Methods

section for more details). Their survey observed barriers to meditation within three main areas: perceptions and misconceptions, pragmatic concerns, and sociocultural beliefs. Although related to the health behavior of individuals, the instrument might be a good indicator of possible barriers among the general population (Rietschel, 2016).

In sum, alternative approaches for engaging students with mindfulness meditation exist in higher education, where the curriculum is typically structured in terms of domain-specific expertise (Bridges, 2000), and students' learning choices might be highly informed by disciplinary norms and values (Weidman, DeAngelo, & Bethea, 2014). That is, if their natural choice of where to invest time and effort is informed mostly by their field, mindfulness may not be on students' radar as a valuable skill to learn. Students in higher education are encouraged to build their own learning path, choosing from offered classes to fulfill their required credits. This environmental condition implies that mindfulness meditation in higher education, if not associated with a professor's pedagogy, counseling service, or research study, must rely strongly on students' autonomous engagement. Moreover, for this type of engagement to occur, it might be necessary to help students reconsider potential barriers to engaging and developing interest in mindfulness meditation.

Theories of Transformative Learning

Transformative learning is a constructivist theory of adult education that originated in Mezirow's (1978) work. Informed by Habermas's (1971) explanation of the different kinds of knowledge, Merizow (1991) identified that through discourse and critical reflection individuals are able to revisit prior beliefs and assumptions to develop

new, more functional strategies to take action in the world. Since as human beings we are wired to make meaning of our experiences (Cranton, 2006), when we are provided with an opportunity to safely and critically reflect on previously unquestioned habits of mind, a shift in perspective may occur that leads to more open and inclusive ways of seeing (Cranton, 2006; Mezirow, 1991; Taylor, 2008). Openness is a crucial characteristic that allows transformative learning experiences because it demonstrates a non-fixed frame of reference that is empathic toward alternative views (Mezirow, 2012).

Other researchers have built on Mezirow's theory, suggesting that in addition to cognitive processes such as discourse and critical reflection, affective and spiritual dimensions contribute to transformative learning experiences (Boyd & Gordon Myers, 1988; Cranton, 2006; Dirkx, 1998; Taylor, 2007). The updated theory proposes that transformative learning encompasses a more holistic approach to learning that involves not only rational or cognitive processes but also somatic, emotional, and relational ways of learning (Carter, 2002; Dirkx, 2006; E. W. Taylor, 2008). Somatic learning derives from an embodied experience of learning that perceives the whole body and sense perceptions as a source of knowledge (Kerka, 2002; Stolz, 2015). Emotional learning posits that self-awareness and feelings are a fundamental part of adult learning (Kasworm, 2008; E. W. Taylor, 2001). Relational learning emphasizes the importance of relationships in transformative experiences (Longmore, Grant, & Golnaraghi, 2018; E. W. Taylor, 2008). These non-rational ways of knowing include practices of contemplation, such as mindfulness meditation.

Holistic components of transformative learning are highlighted in this study through using critical reflection and contemplation, both individually and as a group. On

the one hand, critical reflection is founded in rationality; that is, the individual undergoes exposure to alternative perspectives and discourse such that his or her own points of view can be examined. It the validity of a dissimilar perspective or idea is established, reinterpretation becomes possible. To revise a belief (i.e., unconscious truth), the individual needs to examine it. That is, one needs to be exposed to and investigate one's ideas, not to know why they came to be but to experience what the belief engenders (Cranton, 2006). This exposure may happen through both individual reflection and group discussion, which brings in the relational aspect of learning. Once exposed, a belief can be questioned and changed. A central condition for questioning assumptions and engaging in this type of discourse is learner empowerment. Cranton (2006) indicates that someone who feels oppressed or "trapped in his or her circumstances may not be able to respond to events in a potentially transformative way" (p. 59). Thus, individuals need to feel safe in expressing their points of view and considering those of others to be truly empowered to change.

On the other hand, because transformative learning involves unconscious processes, by nature it cannot be solely cognitive. Contemplation through mindfulness meditation involves the somatic and emotional aspects of learning through embodied practices that facilitate awareness of one's internal processes. Awareness of cognitive and emotional patterns promotes the type of experience that can shape new mental structures beyond unconscious conditioning (Bennett-Goleman, 2001; Shapiro, Brown, & Astin, 2011). As mentioned previously, Shapiro and colleagues (2006) posited that the practice of mindfulness leads to a fundamental perspective shift (i.e., *reperceiving*) over time.

Thus, by developing awareness, one is less prone to react with automatic behavior, allowing for change (Lebois et al., 2015).

In a review of literature on the evolution of transformative learning theory and the outcomes of this approach, Hoggan (2016) described a typology of transformation, laying out criteria for what can be considered outcomes of a transformative learning experience. According to his research, the extent to which learning is transformative varies based on how fundamentally the learner has changed or how the shift has impacted the learner's worldview. Hoggan's (2016) typology suggested that individual change may occur in three main dimensions: experience, concept, and interaction. Within these dimensions, the author described six themes found in the literature attributed to transformative learning outcomes: worldview, self, epistemology, ontology, behavior, and capacity.

Transformation may occur through a dramatic event that can lead to questioning and sense making (Taylor, 2008). However, scholars have pointed out that gradual, cumulative events (Cranton, 2006) or a less dramatic but still somewhat disorienting dilemma can provoke transformative experiences. Such experiences can be brought about by unexpected enlightening conversation or even exposure to a book or painting (Mezirow, 1991). In critically reflecting and expanding awareness, individuals ripen the intention to take action in their lives based on a new understanding. This intention might later become a commitment. Thus, by facilitating critical reflection of one's meaning structures and progressive experiences of contemplation via mindfulness meditation practices, transformative learning may be more likely to take place and shift students' perspectives about mindfulness meditation, so that interest can be developed.

Interest Development for Engagement with Mindfulness Meditation

Interest is an important element for engagement, especially with mindfulness meditation in higher education settings. That is, due to a structure that values disciplinary culture, engagement relies on students' choice, which is informed by interest. As Renninger and Hidi (2016) have argued, interest implies motivation and meaningful, voluntary engagement. Based on their framework, this study defines engagement as directed attention to perform a learning activity (Renninger & Hidi, 2011). The four-phase model of interest development lays out how both cognitive and affective processes might shape the (1) triggering and (2) sustaining of situational interest, which can then inform (3) an emerging individual interest and flourish into (4) a well-developed interest (Hidi & Renninger, 2006).

In the development of mindful skills, one needs consistent, deliberate practice over time (Banerjee, 2016; Moore et al., 2012). That is, mindfulness meditation works in a similar manner to physical exercise; if it is not a recurrent and consistent practice it will not grow to become a skill. However, for autonomous and consistent engagement over time, one needs a well-developed interest (Hidi & Renninger, 2006).

In line with Hidi and Renninger's model (2006; 2016), among the conditions for interest to develop are that learners are able to make connections to the content and actively participate in search of information. Learners should be supported with opportunities to engage and deepen their knowledge and skills and to experience positive feelings that stimulate "a recursive relationship of knowledge and value" (Renninger & Hidi, 2016, p. 11). In later phases of interest (i.e., individual interest), learners may

depend less on external triggers and become more self-regulated in their seeking behavior and learning (Hidi & Renninger, 2006).

With interest development, one cultivates the predisposition or intention to reengage with the topic of interest over and over. Triggering and maintaining situational interest seems to empower students to find personal relevance and meaning (Hidi & Harackiewicz, 2000), which might facilitate setting specific goals and planning actions to attain them (Hidi & Renninger, 2006; Wilson, Switzer, Parrish, & the IDEAL Research Lab, 2007). In fact, promoting utility value was found to be one of four useful interest-enhancing interventions in education (Harackiewicz et al., 2016). Utility value is defined by how relevant and useful an activity or a task is for individuals' goals. The other three interventions listed as useful were context personalization, problem-based learning, and structural features for attention grabbing. Thus, as students develop interest in mindfulness meditation and engage with the practice, they not only understand it better conceptually but also have an embodied experience (Thompson, 2017) to associate with personal relevance and value, which feeds back to more interest.

Integrated Framework of Interest-Based Transformative Learning

The model presented in this study integrates the above frameworks to support the learning of mindfulness in higher education, particularly to allow students to reduce potential barriers to this form of meditation and develop interest in practicing it. The combined framework (Figure 1) has its foundation in the cycles of contemplation and critical reflection (i.e., perspective exploration), designed to aid students' consciousness

expansion (Howie & Bagnall, 2013) by questioning their assumptions and perceptions through both rational discourse and the contemplative practice of mindfulness meditation.

With each perspective exploration, activities to trigger situational interest follow, reinforcing one's intention to practice mindfulness meditation, which may result from a transformative learning experience (i.e., shift in concept, experience, or interaction). As the four-phase model suggests, a triggered situational interest must be accompanied by an opportunity to engage in learning. After engaging, students will be prompted again to critically reflect, initiating another cycle. Interest will be triggered by novelty and investigation (e.g., information seeking), as well as the chance to connect personally with the content through individual narrative and the sharing of pertinent scientific-based evidence with their peers and instructor.

Figure 1

Integrated framework of transformative learning and interest development
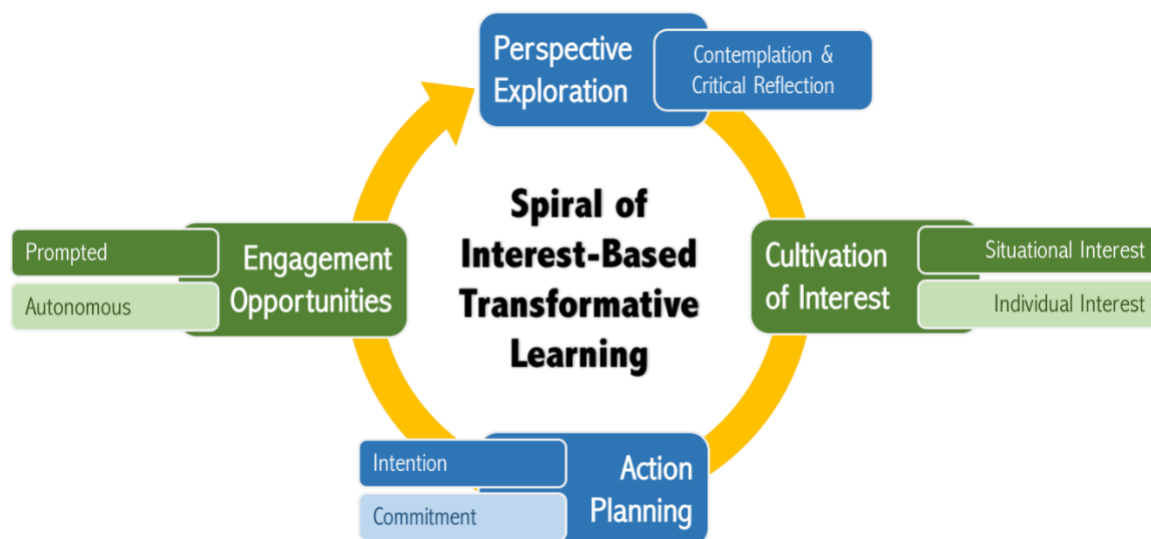
Note. The elements in blue are aspects of transformative learning theory. The elements in green are features of interest development.

The rationale is that each cycle of perspective exploration, interest activation, and engagement opportunities will deepen students' self-awareness and interest. In the long run, these cycles will facilitate students' forward movement from an intention to take action, to a personal commitment to act on their new perspective about mindfulness meditation. For this study, the research design focuses solely on the initial stage of this integrated framework, represented by the darker colors in the spiral in Figure 1. That is, from exploring one's own perspective for potential change, to triggering and sustaining situational interest that might feed one's intention to take action, to providing opportunities to engage. In future research, I intend to expand the scope to incorporate the development of personal interest, which might inform one's commitment to action and autonomous, self-regulated engagement, represented by the lighter colors in the spiral.

Summary

Mindfulness is a secular form of meditation whose ultimate outcome is a certain quality of awareness that aids individuals in being more conscious of themselves. Three main initiatives that have brought mindfulness meditation into higher education: scholars have introduced mindfulness meditation by adopting a contemplative pedagogy in their own courses; researchers have introduced mindfulness meditation by conducting studies about it; institutions have introduced mindfulness meditation by offering it as a resource for students' wellness through counseling services. These initiatives are limited in how they engage students, especially if there are barriers to practice mindfulness meditation.

To help students reconsider potential barriers and develop interest in mindfulness meditation, this study drew from and integrated two theoretical frameworks to design

Mind-IT. Transformative learning is a constructivist theory of adult education that claims that provided with opportunity to safely and critically reflect through holistic ways of learning, individuals may shift perception and cultivate a more open and inclusive view. The four-phase model of interest development lays out how both cognitive and affective processes might shape the (1) triggering and (2) sustaining of situational interest, which can then inform (3) an emerging individual interest and flourish into (4) a well-developed interest that support students' engagement with a content.

The combined framework has its foundation in the cycles of contemplation and critical self-reflection designed to aid students' consciousness expansion by questioning assumptions and perceptions about mindfulness meditation. In each cycle, activities to trigger situational interest and offer opportunities to engage with the content follow, reinforcing students' intention to practice mindfulness meditation. The rationale is that each cycle of perspective exploration, interest activation, and engagement opportunities will deepen students' self-awareness and interest.

CHAPTER III

RESEARCH DESIGN

This chapter presents an overview of the research design adopted in this study, describing the methodological approach and the general characteristics of the population from which I selected participants, as well as the rationale behind sampling and study setting, particularly the choice of an online learning environment for *Mind-IT*. Additionally, I present the first conjecture map guiding the study. To close this chapter, I discuss ethical considerations and my role as a researcher.

Design-Based Research

In this study I used design-based research (DBR), a systematic approach to test and refine educational design interventions in context, through multiple iterations, to advance both design and learning theory, and to impact practice (DBR Collective, 2003; Easterday, Lewis, & Gerber, 2014). The DBR approach was adopted in this study because it allows for practical design interventions to be theoretically framed and tested in real-life settings. DBR includes cycles of design, enactment, analysis, and refinement (DBR Collective, 2003).

In this study, I developed the initial design of the course based on the theoretical framework of interest-based transformative learning. Furthermore, I planned three iterative cycles of DBR to improve the design of *Mind-IT* as well as to inform theory. Through different phases of data collection and analysis that informed design iterations, this study sought to explore and understand how *Mind-IT* might facilitate students' shift in perspective and development of interest in mindfulness meditation for well-being in

higher education. Data were analyzed as they were collected, such that the initial cycle of DBR informed the second, which then informed the third.

The first cycle of DBR was planned to identify context, particularly students' barriers to meditation. Within this initial phase, I also asked students about prior interests that could translate into opportunities for mindfulness meditation. Prior studies looking at interest development have found that individuals are more likely to develop a new interest if it is associated with previous, already stablished interests (Harackiewicz et al., 2016). The second cycle of DBR aimed at testing the usability and identifying relevant interactive functions of *Mind-IT*. In this phase, I explored the ease of use of the course with selected users and studied the navigation and interactive design of top-rated online mindfulness applications in order to draw from their common design features. Finally, the third cycle of DBR piloted *Mind-IT* to understand ways in which individuals might explore their perspectives and develop interest in practicing mindfulness meditation. For that purpose, I offered the course to incoming students in a graduate program.

I used a variety of methodological techniques and data sources throughout the phases of the study. Table 1 presents an overview of the methods of data collection and analysis adopted in each phase, according to the purpose of the DBR cycle.

Table 1

Overview of data collection and analysis methods used throughout the cycles of DBR

Cycle	Research Question	Purpose of Cycle	Data Collection	Data Analysis
First	What preconceived perceptions do higher education students have of mindfulnes meditation?	Determine contextual conditions for engaging with mindfulness meditation	- Survey (background, barriers, and enablers of mindfulness meditation)	- Descriptive statistics - Content analysis

| Second | What features in an online environment can foster individuals' engagement with mindfulness meditation? | Evaluate design functions for engaging with mindfulness meditation | - Benchmarking (design features of mindfulness apps)

- Usability evaluation | - Navigation analysis |
| Third | To what extent do learning experiences with *Mind-IT* help participants change their perceptions of mindfulness as well as develop situational interest in the practice? | Understand students' learning experiences with *Mind-IT* | - Surveys (background, barriers, and situational interest)

- Written reflections

- Focus groups | - Descriptive statistics

- Thematic analysis |

DBR engenders a complex process with several phases of data collection and analysis that build on each other and lead to design iterations. To convey this pluralistic nature of DBR, I employed multiple sources of data with an exploratory emphasis (Onwuegbuzie & Leech, 2005). On the one hand, I used both quantitative and qualitative strategies from traditional social sciences research to enable a more comprehensive examination of students' perspectives on mindfulness meditation and learning experiences with *Mind-IT*. To triangulate and complement research interpretations (Glesne, 2014; Greene, Caracelli, & Graham, 2008; Maxwell, 1996), data were collected using multiple sources, particularly surveys, focus groups, and written reflections. On the other hand, I also drew on UX design methods to evaluate the design of *Mind-IT* and other interactive technologies offering mindfulness meditation online. UX design aims at understanding and improving users' experiences with a product or service (Merholz, 2012; "User Experience Basics," n.d.). A more in-depth description of data sources and analysis used in the study will be presented in the following chapters, in which I describe each phase of DBR separately along with its respective methods.

Participants and Setting

Participants for this study were drawn from a mid-size university in the state of Utah. I selected graduate students enrolled in the School of Veterinary Medicine to be part of this study because they were a population with high levels of anxiety that could benefit from mindfulness but also had demonstrated barriers to engaging in meditation (H. Rutigliano & C. Chapman, personal communication, December 5, 2017). Research has shown that levels of anxiety and depression are especially high among veterinary students (Hafen, Reisbig, White, & Rush, 2006; Siqueira Drake, Hafen, Rush, & Reisbig, 2012). Some of the predictors of such conditions have been identified as a heavy workload, perceived health, and homesickness (Hafen, Reisbig, White, & Rush, 2008; Siqueira Drake et al., 2012).

The selection of participants from this population was purposeful (Patton, 2001), and a total of 40 students participated, adding all three phases of DBR. Detailed information on recruitment and number of participants in each phase will be presented in the following chapters, in which I describe each cycle of DBR. Data from the School of Veterinary Medicine website indicated that students ranged in age from 21 to 38 years old. Gender ratio within enrolled students was almost equal, with slightly more female (53%) than male (47%) enrollments. This school accepts only 30 students per year, of which 20 are Utah residents and 10 are nonresidents. The resident tuition is $23,358 and the nonresident tuition without a waiver is $56,588, not counting student fees, supplies, and living expenses. This is a considerable expense for most students, and the investment may require them to take loans, which can be an additional stressor in their lives. A professor from the school stated that most students accepted in the program are A

students, with just a few B students (H. Rutigliano, personal communication, February 1, 2018), which means only excellent students get in and competitiveness is high.

Although this study claims that mindfulness meditation is useful for more than just stress reduction, these students seemed particularly likely to benefit from learning meditation. What is more, program staff were exceptionally receptive to this intervention and saw it as an opportunity to offer support to their students. A study investigating overall stressors and veterinary student coping mechanisms suggested that such programs should integrate life balance training and psychological services to ameliorate distress (Kogan, McConnell, & Schoenfeld-Tacher, 2005). Yet both a professor and the director of wellness in the School of Veterinary Medicine (H. Rutigliano & C. Chapman, personal communication, December 5, 2017) suggested that students generally have barriers to practicing mindfulness, which indicates they would be ideal participants for this study.

This study assumed that participants were somewhat new to mindfulness practice and that this lack of experience and knowledge was partially to blame for creating barriers to engaging with the practice. Further, because mindfulness meditation is rooted in Buddhist practices, additional barriers could arise because of religious affiliations—the largest religious group in Utah is the Church of Jesus Christ of Latter-Day Saints (Association of Statisticians of American Religious Bodies, 2010).

Learning Environment

This study focused on designing and iteratively refining an introductory online course for students in higher education to incorporate mindfulness meditation into their lives. Because the long-term intention was to facilitate students' engagement with mindfulness meditation, the use of an online platform as the learning environment was

assumed to be ideal for a few reasons. First, since it allows broad and flexible access (Kim, 2005), an online environment encourages self-directed learning and gives students the possibility of fitting mindfulness meditation into their schedules. Because of the consistent growth of online higher education (Allen & Seaman, 2017; Allen, Seaman, Poulin, & Straut, 2016), this medium allows for future expansion of the course to all students, regardless of their location. Finally, because transformative learning requires that students feel safe in order to critically self-reflect and open up to different perspectives (Cranton & Taylor, 2012), an online environment has the potential to empower them to engage to the level of anonymity they feel comfortable with, preventing them from feeling too awkward or exposed. I decided to use Canvas, the learning management system (LMS) commonly used in educational institutions, to build the course to avoid the need for participants to learn a new LMS. Materials and procedures used within each of the three recruitment phases will be described in the next chapters, in which I describe each cycle of DBR.

Conjecture Mapping

To show specific relationships between design, theory, and expected outcomes in DBR, Sandoval (2014) proposed conjecture mapping. This approach to research design in DBR starts from (1) a high-level conjecture about how to support learning in a specific context, which generates design conjectures about (2) embodiment and (3) mediating processes of learning that, ultimately, lead to (4) desired outcomes that answer a theoretical conjecture. That is, conjecture mapping can help provide a clear structure to DBR methodology and allows a distinct association of learning theory with intervention design.

For the initial conjecture map of this study (Figure 2), which informed the early prototype of the course, I considered what the literature said about learning experiences that might facilitate perspective exploration in adult education (i.e., transformative learning theory; Cranton, 2006; Mezirow, 1997; Taylor, 2008) and ways that situational interest could be both triggered and sustained (Hidi & Renninger, 2006; Renninger & Hidi, 2016). In addition to being guided by theory, and in line with a DBR approach (Brown, 1992; Collins, 1992), I considered what the professor and the counselor in the School of Veterinary Medicine shared about needs and constraints of students in the program. I met with them twice to discuss and receive feedback on ideas (H. Rutigliano & C. Chapman, December 5, 2017; H. Rutigliano, February 1, 2018). The information they provided led to specific design decisions and confirmed the importance of using individual writing activities for self-reflection and reserving group activities for evidence-based discussion. For example, they stated that students in Veterinary Medicine are generally reserved when talking about and expressing their feelings, leading to discomfort when done in a group context. Also, the professor indicated that students tend to have a very rational mindset, heavily motivated by science. Confirming the need for mindfulness meditation among students, both the professor and the counselor shared that these students are exceedingly stressed and are in a high-demand degree program, but they have clearly demonstrated barriers to practicing mindfulness meditation when this is suggested to them.

In this study, I developed an argument that higher education students need to feel safe enough to explore and transform their perspectives in order to overcome potential barriers to practicing mindfulness meditation. Furthermore, to engage with mindfulness

meditation, students need to develop interest, so that they can practice autonomously and regularly. Based on this argument, I established the high-level conjecture that *facilitating perspective exploration and development of situational interest helps students in learning and practicing mindfulness*.

Figure 2

First conjecture map based on both theory and initial context
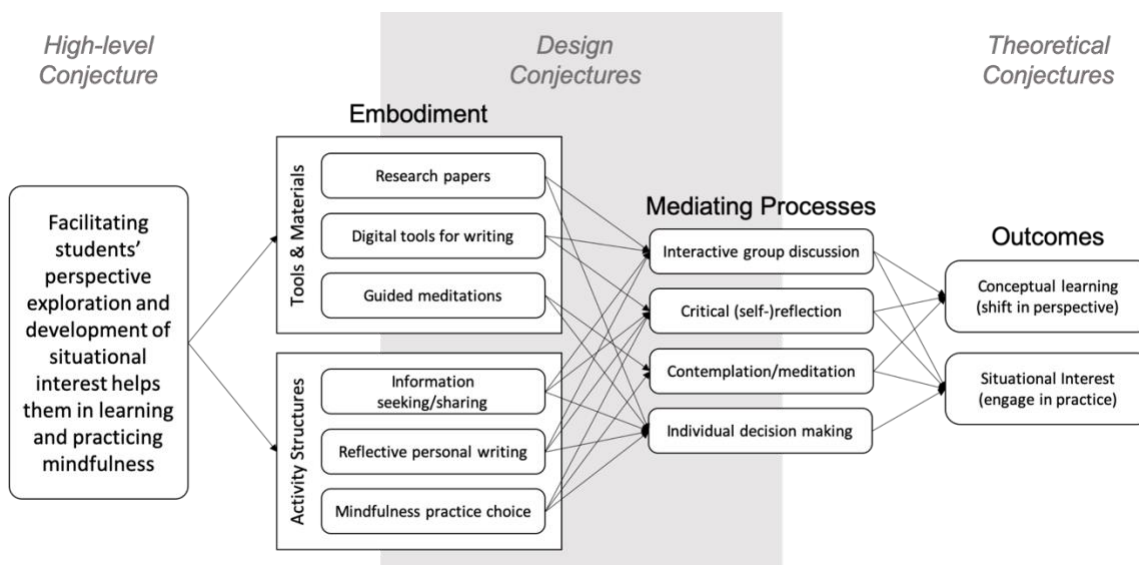
The high-level conjecture translated into design conjectures through choices of both embodiment and assumed mediating processes. To explore their perspectives, students must engage in mindful contemplative practices and critical self-reflection, which they may do only if they find the learning environment conducive to diverse views and non-threatening to their identity (Boyer, Maher, & Kirkman, 2006; Mezirow, 1987). The online environment offered students privacy to learn and practice meditation and still have a group experience, but prevented them from feeling self-conscious and awkward, since group involvement was limited to science-led discussion boards only.

If a safe space exists and students are confronted with valid and clarifying learning experiences, they may revise prior beliefs and assumptions and adopt more functional behaviors based on their shift in perspective (E. W. Taylor, 2008; E. W. Taylor & Cranton, 2012). However, for engagement with an activity or topic to be driven by students' own interest, they must have personal connection with the content, a sense of individual choice and autonomy, an element of surprise or newness, opportunities to engage with and seek information, and positive learning experiences (Hidi & Renninger, 2006; Renninger & Hidi, 2016). Thus, I designed activities for students to individually explore their knowledge and personal relationship with mindfulness meditation, and to engage in contemplative exercises and written reflections that offered opportunities to reconfigure prior perceptions. Also, I designed an activity for students to search for and discuss new science-based information about mindfulness meditation in relation to a topic they found meaningful (e.g., anxiety, depression, academic performance, etc.), which helped them validate alternative perspectives.

Ethical Considerations

This dissertation study proposal was submitted to the USU Institutional Review Board (IRB) to undergo a process of consideration and fulfilment of ethical requirements in research. To secure compliance with IRB regulations and procedures, prior to collecting data, I gathered signed informed consent forms from each participant at each phase. Through the form, they had access to information about the study's purpose and procedures, including information about anonymity and confidentiality. All participants were informed that their participation was voluntary and that they could withdraw from

the study at any time without consequences. Rules of compensation applied to their involvement in the study and were thoroughly communicated to participants in all phases of the DBR.

Methods for Ensuring Trustworthiness

From a pragmatic point of view, the adoption of multiple sources of data emphasizing exploratory inquiry may employ different strategies to ensure a rigorous approach. The criteria for evaluation of trustworthiness and validity are determined in congruency with theoretical underpinnings and a strong self-awareness of researcher positioning (Giddings & Grant, 2009).

Credibility and Dependability

To establish credibility, meaning that as the researcher I represented participants' accounts accurately, I adopted triangulation (Glesne, 2014; Patton, 2001) as a validation strategy by including multiple views (different cohorts of students) and methods (e.g., surveys, focus groups, writing reflections). By comparing diverse sources of data, I attempted to provide credible findings. To strengthen validity, as much as possible I selected survey instruments that had been previously validated in research studies.

To engender dependability, clear and reliable procedures of collecting and interpreting data, I provided a detailed account of my research process. Also, because I was aware of my role as an instructor-researcher and my personal investment with the topic, I made a conscious effort to minimize my biases by focusing on empirical evidence (Patton, 2001) and understanding the influence of my values (i.e., reflexivity), rather than trying to eliminate myself from the research (Maxwell, 1996).

Researcher Perspective

Meditation became part of my life very early on when I listened to a practice called *body scan* that my mother would use to put me to sleep. When I was about five years old, she took me to learn my first formal meditation practice with a teacher who came into town for a couple of days. Back then I did not make much sense of these practices, but they felt good and that was all I needed to know.

Growing up, I would occasionally engage in meditation, but it was not until I had an emotionally difficult, transformative experience after finishing my undergraduate studies that meditation became a personal interest. When I moved to the United States to pursue my doctoral degree, I did not know what kinds of experiences to expect, but I certainly knew it would not be easy. Little did I know how challenging the journey would be and how mindfulness meditation would be a supportive personal resource.

The hardship of moving to a different country by myself, added to the demands of academic life as a graduate student, would have been unbearable if not for the opportunities I found to engage in mindfulness meditation. It all started during orientation week, when I found out that the university had a meditation club. The club led me to other meditation groups in town that provided both incentive and engagement opportunities to strengthen my knowledge and practice of mindfulness meditation.

During times when graduate school was challenging, I noticed how much impact meditation had on my resilience, emotional competency, and ability to focus my attention. When I started reading about mindfulness meditation in educational settings, I realized this would be my dissertation research. Up until then, meditation had been just a personal practice, but when I found scientific evidence that students could use

mindfulness meditation as a tool to persist in their academic journey, mindfulness meditation aligned with my professional goal of researching ways university students might be motivated to continue learning and attain their goals.

Summary

This study adopted a design-based research (DBR) to test and refine the design of an educational intervention in the context higher education. Through three phases of data collection and analysis that informed design iterations in *Mind-IT*, this study sought to explore and understand how *Mind-IT* may facilitate students' shift in perspective and development of situational interest in mindfulness meditation. Participants were drawn from the School of Veterinary Medicine in a mid-size university in the state of Utah. I used a variety of methodological techniques and data sources throughout the phases of the study. Data were collected and analyzed in each cycle, such that the initial cycle of DBR informed the second, which then informed the third.

The first cycle of DBR was planned to identify the learning context, particularly students' barriers and enablers to meditation, using a survey. The second cycle of DBR aimed at testing the usability of *Mind-IT* and identifying relevant interactive functions of top-rated online mindfulness applications to draw from their common design features. In the third cycle of DBR, I piloted *Mind-IT* within a cohort of students to understand how learning experiences in *Mind-IT* helped them explore perspectives and develop situational interest to practice mindfulness meditation.

CHAPTER IV

FIRST CYCLE OF DBR

In this chapter I present the first cycle of DBR. I describe the process of recruiting the participants, the procedures for collecting data, the sources of data used and analysis conducted, and how findings led to iterations in the design. The purpose of the first cycle of DBR was to inspect prior beliefs and assumptions about meditation to determine the learning context around students' needs. The driving question of this phase was: What preconceived perceptions do higher education students have of mindfulnes meditation? Thus, I gathered information about prospective users of *Mind-IT*—background characteristics, perceptions about meditation, and individual interests—to inform and refine *Mind-IT*.

Methods

In this phase of the study, I surveyed Veterinary Medicine students from different cohorts in the program. Next, I explain how participants were recruited, the types of questions that were combined in the survey, and the type of analysis employed with the collected data.

Procedures

The first phase of the DBR happened during the summer semester of 2018. For this initial phase, which aimed to elucidate facilitators and barriers to mindfulness meditation, all the enrolled students in Veterinary Medicine received recruitment emails from the school administration inviting them to participate in a 10-minute online survey

(see Appendix A) via Qualtrics. On June 6th, the department head of the School of

Veterinary Medicine sent a first email to all four cohorts enrolled in the program, totaling

120 students. The same content from the email was also posted on the program's

Facebook page, which the same students had access to. Participation was voluntary, and

all participants who completed the survey entered a raffle to win a $50 gift card as

compensation for their time and effort. During the following two weeks, only 14 students

clicked on the link provided in the email and participated in the survey. On June 20th, the

director of student and academic affairs of the School of Veterinary Medicine sent the

same recruitment email to all students a second time. Within the following two weeks, 10

additional students participated in the survey. On July 3rd, the director sent the email

again for the last time, which yielded no additional participation. In this phase, I intended

to recruit at least 30 participants by July 13th. However, only 24 students replied to the

recruitment invitation by clicking on the online survey link. Of these 24 respondents, one

did not complete the survey, leading to a total of 23 participants. Based on their answers,

I had the first iteration of the design. I adapted the course to include content and activities

to better address the main barriers and interests indicated by participants in the survey.

Data Sources

In the first cycle intended to determine contextual conditions for learning

mindfulness meditation among the population, I conducted a needs assessment through

an online survey to identify students' characteristics, interests, experiences, beliefs, and

barriers to engaging with mindfulness meditation. These data provided new perspectives

on the possible facilitators and main barriers that would need to be addressed in *Mind-IT*

so that it would be meaningful to students.

Survey

I conducted a survey to collect demographic data and examine students' prior interest in and experience with mindfulness meditation (see Appendix B). The survey contained 22 questions, both closed- and open-ended, which aimed to identify students' learning context and facilitators of engagement with mindfulness meditation. Additionally, to identify potential barriers to meditation among students, I used a psychometrically tested and validated survey instrument (see Appendix C), the Determinants of Meditation Practice Inventory (DMPI; Williams et al., 2011). Using Likert scale items, it divides the attitudes and beliefs of novice meditators about practicing meditation into three main categories: (1) perceptions and misconceptions, (2) pragmatic concerns, and (3) sociocultural beliefs. The survey comprised 17 items in a 5-point Likert scale self-report (from 1 = strongly disagree to 5 = strongly agree), and scores could range from 17 (i.e., lower perceived barriers) to 85 (i.e., higher perceived barriers). The instrument reliability was found to be high, with a Cronbach's α of 0.87. Examples of survey items included "Meditation might be boring," "Prayer is my form of meditation," and "I don't have time." Data were collected online through Qualtrics and downloaded to a secure Box folder.

Data Analysis

In this initial cycle, I conducted different analyses with the survey data. First, descriptive statistics helped to quickly identify frequencies of response and items with highest scores that indicated the most common barriers to meditation among students in Veterinary Medicine, as well as their average level of prior knowledge and interest. I used RStudio Desktop version 1.1.456 to run the analysis. For other open-ended

questions in the survey, I conducted content analysis (Wilkinson, 2000) to identify

commonalities and differences among participants' responses. Thus, I first performed

open In Vivo Coding (Saldaña, 2013) by manually underlining words and phrases that

indicated the main topics of participants' answers. In a second cycle of analysis, I

conducted Focused Coding (Saldaña, 2013), in which I identified patterns and color-

coded the In Vivo codes, assigning labels and organizing them into categories.

Additionally, I used KH Coder (Higuchi, 2016) version 3—an open-source software for

textual analysis that provides a variety of visualization techniques—to measure co-

occurrence of networks of words. These analyses functioned as a needs assessment, that

is, they informed the design of the course in terms of learning context and possible

strategies to better address students' needs.

Findings

The focus of this initial phase was investigating students' beliefs and assumptions

about meditation, as well as uncovering prior interests that could become facilitators of

their engagement with mindfulness meditation. The main research question guiding this

initial phase of the design was: What preconceived perceptions do higher education

students have of mindfulnes meditation? More specifically, I sought to identify students'

background characteristics to gain a clearer picture of the Veterinary Medicine students,

their needs, and possible barriers they might have to engaging with mindfulness

meditation. By conducting a needs assessment, I determined the contextual conditions of

learning mindfulness meditation and refined *Mind-IT* to better address students' needs.

Determining Contextual Conditions

In this phase of the study, I took an exploratory approach and analyzed the online survey data (see Appendix B and C) using both descriptive statistics and content analysis. Descriptive statistics showed that of the 23 respondents who completed the survey, apart from one participant who declared mixed race, all were White. The average participant age was 28 years old, with a range from 23 to 43 years of age. The gender breakdown showed more women (74%) than men (26%) participated in the survey. This sample is somewhat representative of the population, according to the available class statistics, which indicated an average age of 24.3, ranging from 20 to 36, and a gender split of 76% female and 24% male. Only one of the participants was a part-time student; nonetheless 13 (57%) reported they were working, and of those, two had full-time jobs. Participants' marital status was 48% single, 43% married, and 9% divorced. The majority of participants (74%) did not have children, and of those who did (26%), the average number of children was two, with a range from one to five. Nine participants (39%) declared themselves non-religious, whereas 11 (48%) indicated they were formally part of a religious organization, and three (13%) only casually.

When asked about their knowledge of mindfulness meditation, only four (17%) participants had never heard of mindfulness before. Of the 19 participants (83%) who had heard of it, 32% indicated their level of knowledge was high, while 63% indicated they had some knowledge, and 5% rated their knowledge as low. In terms of practice, 14 (74%) of those who knew of mindfulness had also practiced it, as opposed to five (26%) who had heard of it but had never tried engaging with it. Of these, one (7%) reported a

low level of practice, 11 (79%) indicated some level of practice, and two (14%) reported

a high level of practice (Figure 3).

Figure 3

Participants' self-declared level of knowledge and practice of mindfulness meditation
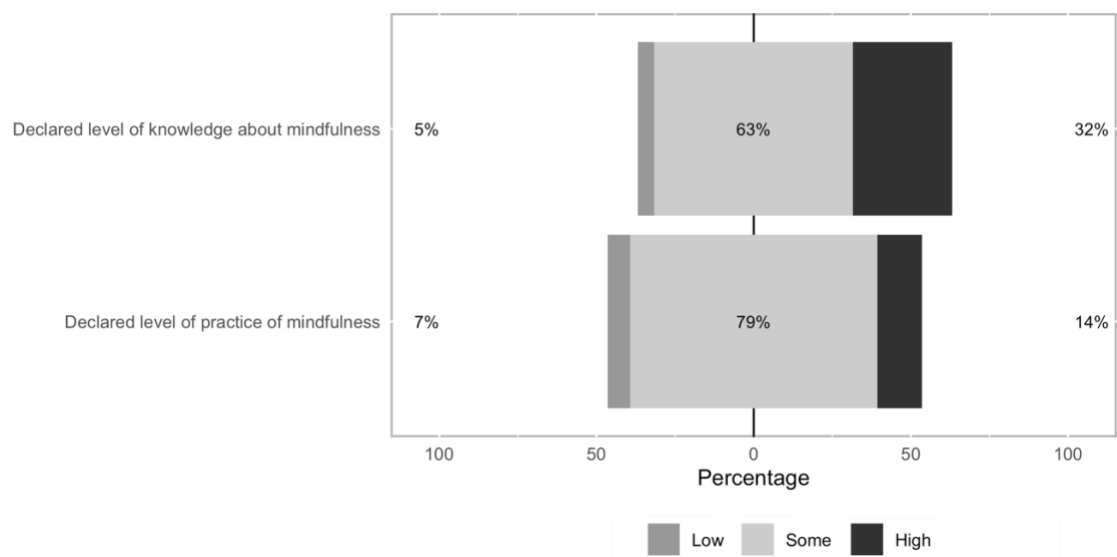
Next, in an attempt to understand what would be most meaningful to participants,

the survey listed research-based outcomes of practicing mindfulness meditation and

asked participants to check the ones they found motivating (Figure 4). Almost all

participants (91%) reported that enhancing well-being and reducing stress were equally

motivating benefits of practicing mindfulness meditation. Improving academic

performance (83%) and perceptions of life quality and balance (78%) followed in the

rank of perceived meaningful outcomes. The least motivating aspects reported by

participants were improved self-regulation (48%) and reduced mind wandering (43%).

Figure 4

Rank of motivating and meaningful research-based outcomes of practicing mindfulness
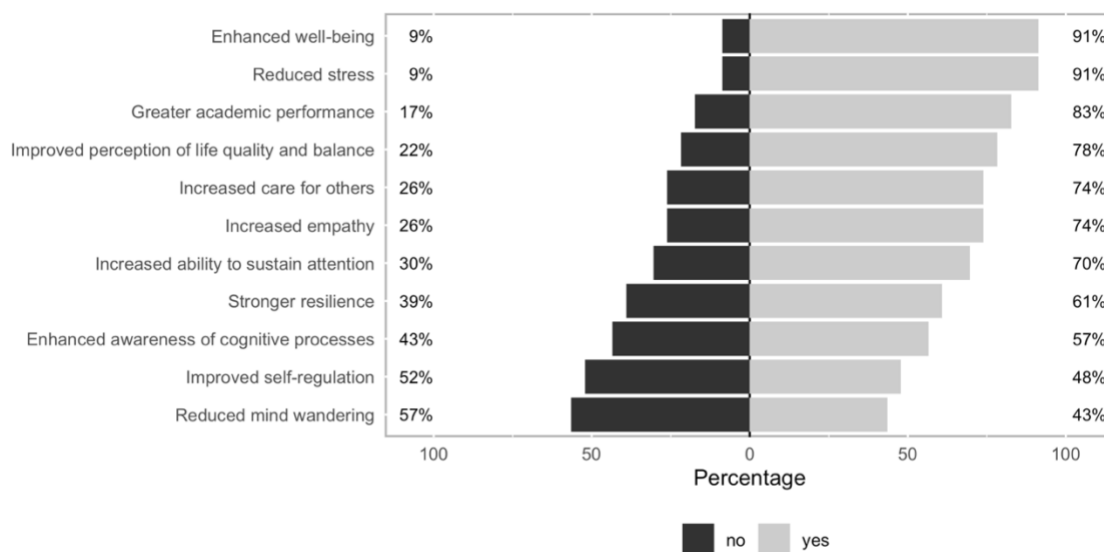
Following this, the survey asked participants to write down factors that might influence their decision to enroll in a mindfulness meditation course. As mentioned previously, for this and other responses to open-ended questions in the survey, I performed content analysis (Wilkinson, 2000). The purpose was to identify the most common factors indicated by participants. For the question about factors influencing enrollment in a short mindfulness meditation course, my analysis identified five main topics: convenience, cost, course features, performance, and well-being.

Table 2

Coding scheme for factors that might influence decision to enroll in a mindfulness meditation course

Category	Description	Coding rule example	Frequency
Convenience	Having enough time and flexibility, course fitting schedule and being easily accessible	Time, convenience, flexibility, options, schedule, easy access	11 (48%)

Cost	Price of the course and concern that it be free or low cost	Price, free, cost	6 (26%)
Well-being	Association of mindfulness with reduced stress and anxiety	Anxiety, stress, insomnia	6 (26%)
Performance	Association of mindfulness with better academic performance	Exam, attention, procrastination, grade, focus	5 (22%)
Course features	Characteristics of the course itself, including liking the teacher and applicable content	Instructor, teacher, action, science-based, online	5 (22%)

Note: Frequency column shows word count within each category and percentage in parentheses.

To gain a broader perspective of the content analysis, I used the Frequency of Codes command in KH Coder (Higuchi, 2016) to identify the most typical coding schemes based on the specified coding rule (Table 2). KH Coder searched within each participant's response for words associated with the coding scheme. Frequency was given by the number of times participants answered with words related to each category's codes. Percentage was calculated in relation to the total number of participants, thus summing up to more than 100%, as participants could write down many factors.

According to participants' answers, the main reason to enroll in a two-week mindfulness meditation course was convenience. That is, if the course did not require much time, fit their schedule, and was flexible and easy, then they would be more likely to enroll. In addition, participants wanted a course on mindfulness meditation to be either free or low cost to attract enrollment, as well as focused on the well-being of students, particularly to reduce stress and anxiety. Furthermore, participants stated that helping to improve academic performance was as important as learning applicable content and liking the teacher.

Additionally, I used KH-Coder to generate Co-occurrence Networks of Words to visualize how the words in participants' responses were interrelated with some of participants' background characteristics. Participants were the unit of analysis, and all words (i.e., nouns, adjectives, adverbs, and verbs) in their answers were included. This visualization allowed me to see what was either shared or unique among participants' answers depending on whether they indicated any prior knowledge of (Figure 5), practice with (Figure 6), or interest in mindfulness meditation (Figure 7).

Figure 5

Co-occurrence Network of Words of factors influencing enrollment in a mindfulness meditation course differentiated by participants' prior knowledge of mindfulness
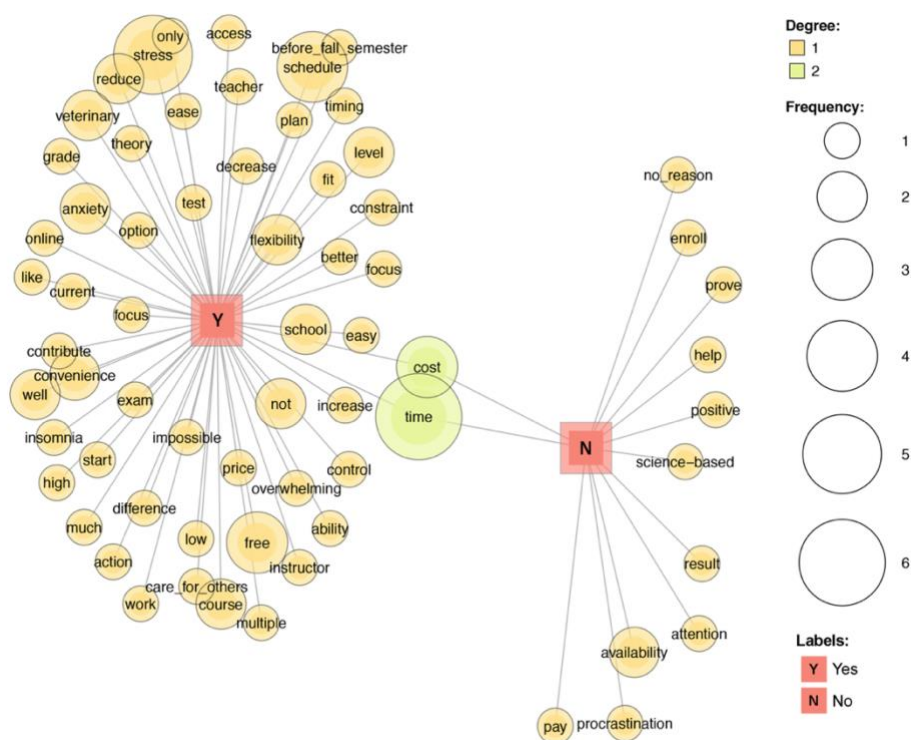
Note. The labels stand for participants who declared they had (Y) or did not have (N) knowledge of mindfulness meditation. Figure generated by KH-Coder.

As shown in Figure 5, "time" and "cost" were words used independent of whether individuals had heard of mindfulness before, confirming the importance of convenience and cost for all participants. Those who had any prior knowledge of mindfulness used words related to well-being (e.g., stress, insomnia, anxiety, care for others), in addition to other types of words, encompassing all categories of the content analysis. In comparison, those who had not heard of mindfulness focused on course features (e.g., science-based) and performance (e.g., attention, procrastination). Also, a participant who had never heard of mindfulness was the only one who said, "I see no reason that I might enroll."

Figure 6

Co-occurrence Network of Words of factors influencing enrollment in a mindfulness meditation course differentiated by participants' practice of mindfulness
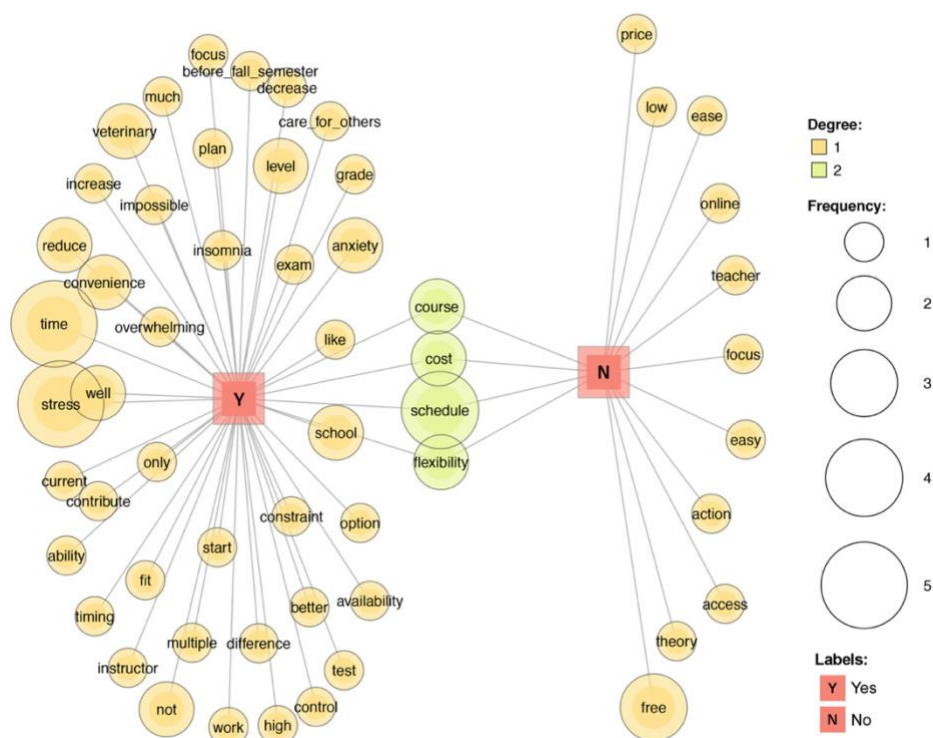
Note. The labels stand for participants who declared they had (Y) or had not (N) practiced mindfulness meditation. Figure generated by KH-Coder.

Participants who had done any level of mindfulness meditation (labeled Y) used words related to well-being to describe their reason to enroll in a course, as opposed to participants who knew of mindfulness meditation but had never practiced it (labeled N). This difference suggested an association between practicing mindfulness meditation and searching for wellness (Figure 6).

Figure 7

Co-occurrence Network of Words of factors influencing enrollment in a mindfulness meditation course differentiated by participants' likelihood of meditating if optional in a course
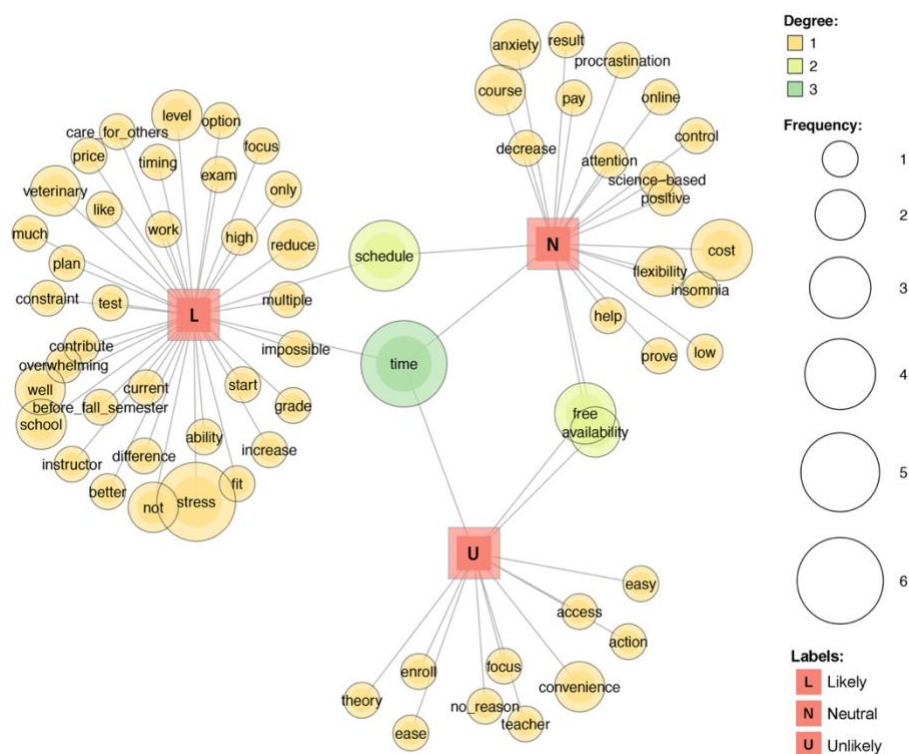
Note. The labels stand for participants who declared they were likely, neutral, or unlikely to meditate if optional in a course. Figure generated by KH-Coder.

In terms of likelihood of practicing mindfulness meditation if offered in a course (i.e., interest), all groups used the word "time" in their answers to possible factors for enrollment (Figure 7). What is more, "time" was the only word shared by individuals

who declared they were either likely or unlikely to enroll. Both neutral and unlikely groups indicated "cost" and "availability" as factors. A concern about scheduling was shared by both neutral and likely groups.

To evaluate participants' initial interest in mindfulness meditation, the survey asked them to indicate their likelihood of practicing mindfulness if it was an optional activity in a course. Using a 5-point scale, 10 participants (44%) indicated they would likely practice, seven (30%) were neutral about it, and six (26%) indicated they would be unlikely to practice. When participants were asked about contributing factors that would prevent them from fully engaging in a two-week mindfulness meditation course, the reason they chose most often was not having enough time (87%), followed by having an overload of academic demands (74%). None of the participants indicated that identifying a religious conflict would prevent their participation. Of the given factors, not seeing the content as important was selected only 17% of the time (Figure 8).

Figure 8

Rank of factors that might contribute to disengagement with a mindfulness meditation course
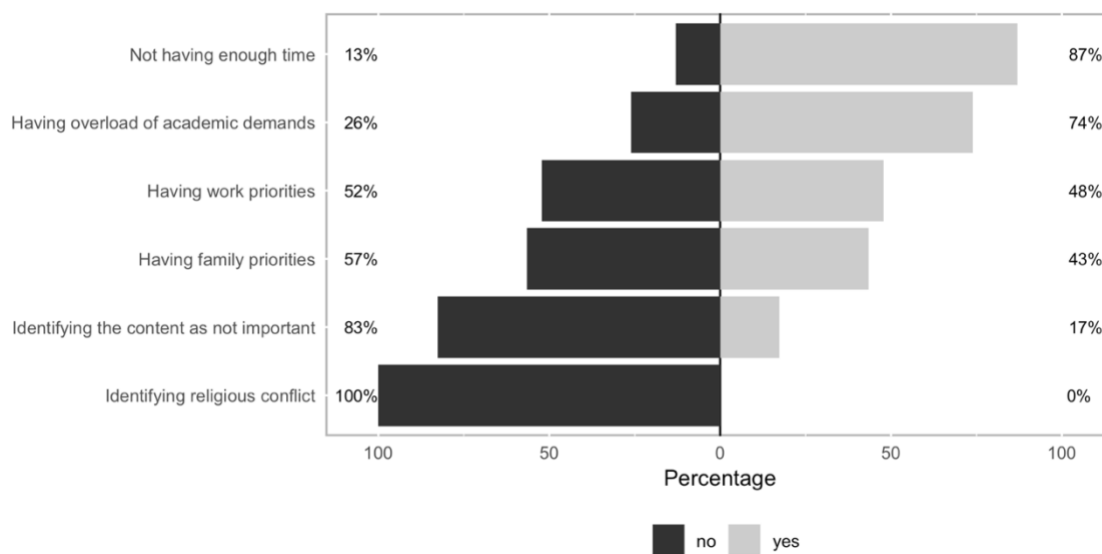
Next, the survey prompted participants to name at least two activities they had done for the past couple of years just because they wanted to, not because they had to. This question aimed to identify individuals' well-developed interests to integrate mindfulness meditation with activities they already engaged in. I documented five main types of activities these individuals were interested in: being active, being in nature, being with animals, being with others, being chill.

Table 3

Coding scheme for question about activities in which individuals had a well-developed interest

Category	Description	Coding rule example	Frequency
Being chill	Being by oneself with the goal of relaxing	Reading, painting, meditation, gardening, movie, pottery, television, crochet	16 (70%)
Being active	Enjoyment of physical activities	Paddle boarding, rock climbing, working out, lifting weights, gym, yoga, biking, skiing, running, ice skating, snowboarding	13 (57%)
Being in nature	Activities driven by being out in nature	Camping, trail, fishing, mountain, river, hike, backpack	13 (57%)
Being with animals	Activities around animals such as riding horses	Riding horses, dog, animal	7 (30%)
Being with others	Enjoyable times involving friends and/or family	Road trip, kid, daughter, friend, video game	6 (26%)

Note: The frequency column shows the word count within each category and the percentage in parentheses.

I used the Frequency of Codes command in KH-Coder to identify the most typical activities based on the frequency of terms by category (see Table 3). Frequency was given by the number of times participants answered with words that, according to the coding rule, applied to each category. Percentage was calculated in relation to the total

number of participants, thus summing up to more than 100%, as participants were asked

to write down at least two activities.

Figure 9

Co-occurrence Network of Words of activities of interest differentiated by participants' likelihood of meditating if optional in a course
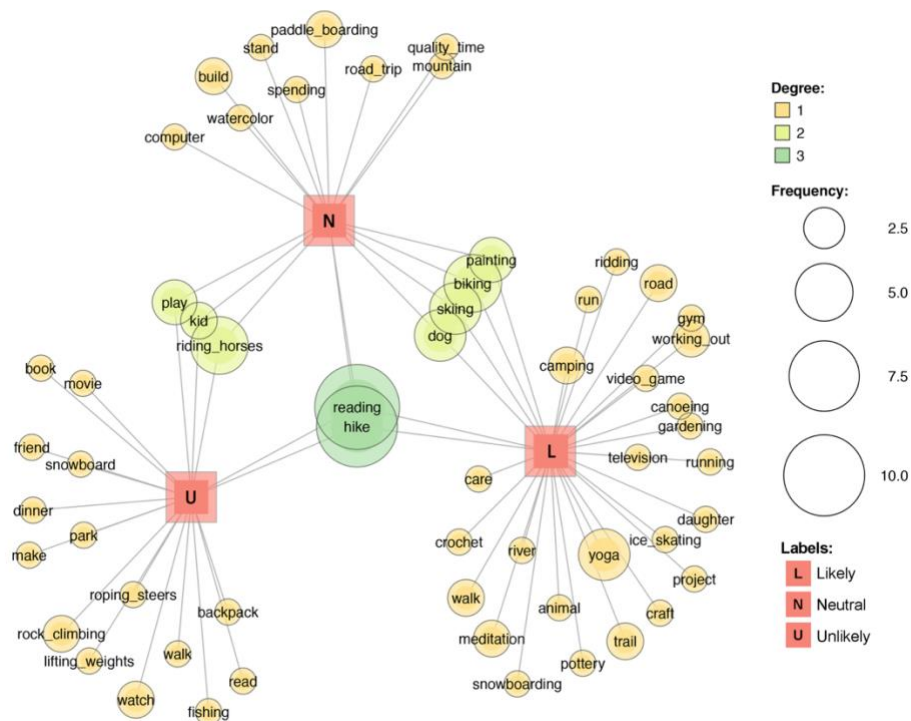
Note. The labels stand for participants who declared they were likely, neutral, or unlikely to meditate if optional in a course. Figure generated by KH-Coder.

To visualize how the words in participants' responses were interrelated with some

of participants' background characteristics, I generated Co-occurrence Networks of

Words. Participants were the unit of analysis, and all words (i.e., nouns, adjectives,

adverbs, and verbs) in their answers were included. This visualization allowed me to

identify possible activities that were already of interest to participants and could become

entry points to mindfulness meditation by associating mindfulness with those activities,

especially for those who were neutral or unlikely to engage with meditation (Figure 9).

All three groups (i.e., likely, neutral, and unlikely to meditate) indicated that both

reading quietly at home and going out in nature for a hike were common activities of

interest. Being with animals, either horses or dogs, was also a common thread.

Figure 10

Rank of reasons participants felt it might be difficult to meditate
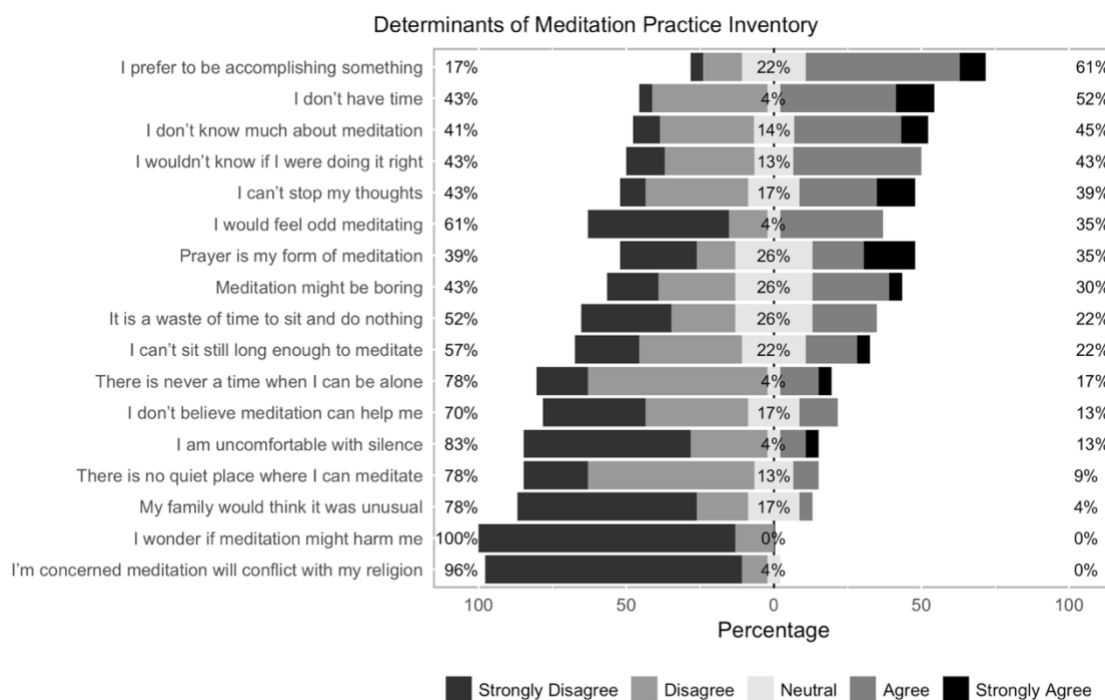
Finally, for the last part of the survey, participants indicated their level of

agreement with different statements about reasons it would be difficult for them to

meditate. The perception of meditation taking valuable time seemed to be the main

concern (Figure 10). Sixty-one percent of participants reported that they preferred to be

accomplishing something—that is, using their time not to meditate but to do or achieve

something. In addition, 52% of participants stated that they did not have time, and that

was a reason meditating was difficult for them. Next in the list of rationalizations were

concerns about not knowing enough. For example, 45% of participants indicated they did

not know much about meditation. What is more, 43% agreed that they would not know

whether they were doing it right, and 39% reported that they could not stop their

thoughts, which indicates a misconception or lack of knowledge about what mindfulness

meditation entails. None of the participants indicated that they feared meditating might

harm them or conflict with their religion, but some specified praying as their meditation

(35%). Although some participants indicated that they would feel odd meditating (35%),

only a few were concerned that their family would think it was unusual (4%).

Findings from this first cycle of DBR functioned as needs assessment, providing

specific information about the learning context for an introduction to mindfulness

meditation course. By identifying background characteristics and perceptions of the

Veterinary Medicine students, I was able to determine potential needs and barriers they

might have to engaging with mindfulness meditation. Next, I present how this phase

informed *Mind-IT* and culminated in the first design iteration.

Iterations

In sum, there seems to be some awareness among Veterinary Medicine students

that mindfulness meditation may benefit their well-being, in particular as related to

reducing stress and anxiety. Their concern aligns with the general profile of being

extremely busy with both school and work and explains why the main stated barriers for

meditation were preferring to accomplish something in the time they had or even having

enough time to meditate. Additionally, most participants pointed to time and academic overload as hindrances to their full participation in a mindfulness meditation course.

With this in mind, the first refinement to *Mind-IT* was to shorten the length of the activities in the course, making sure none would take more than 30 minutes. A course of reduced length with activities distributed equally throughout the weeks might be more appealing, or at least serve to reduce barriers to students' full participation and engagement with mindfulness meditation practices.

More than not having enough time overall, participants were constrained by a tight schedule. Convenience was the main stated factor influencing their decision to enroll in a mindfulness meditation course, followed by cost. This confirmed the benefit of *Mind-IT* being online and offered freely. This also highlighted the importance of developing interest so that students would begin to choose to engage with mindfulness meditation, and make time for it. However, it became clear through the data analysis that participants held a narrow view of mindfulness and sometimes had misconceptions about it. For example, most participants appeared to assume that meditation would not help them accomplish anything, and some participants believed the misconception that meditation meant they needed to stop their thoughts.

Thus, the second refinement of *Mind-IT* was to include baseline information that was backed up by scientific evidence but presented in an easily digestible form. The idea was to facilitate students' learning by offering opportunities to expand their understanding of mindfulness such that they would see a reason for engaging with *Mind-IT* and practicing meditation. The first version used secular language to place mindfulness as a human skill that could be learned, much like physical exercise for

health. I focused on presenting what mindfulness meditation offered that might help

students accomplish things by looking at it from the perspective of an aid to productivity.

I also presented a broader perception of mindfulness that went beyond the mainstream

knowledge of it being exclusively for stress reduction. At the end of the introduction

module, I added a short (about 7 minutes) breathing mindfulness exercise to encourage

immediate practice and learn from doing. In bringing cognitive knowledge into embodied

experience, students might start feeding into the recursive relationship between

knowledge and value that supports the development of interest (Renninger & Hidi, 2016).

Figure 11

Second conjecture map adjusted based on contextual conditions of needs assessment
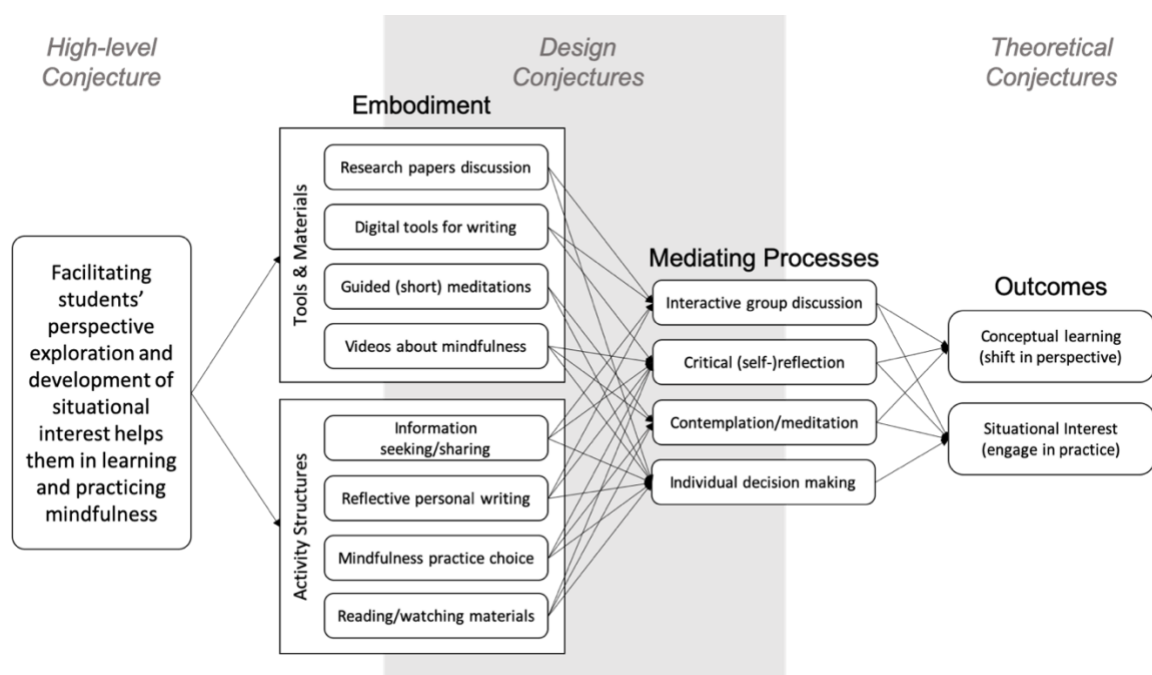
After analyzing the survey data from the first cycle of DBR, I adjusted the

conjecture map to depict the revised relationships between conjectures (Figure 11). In

sum, I made the calendar of the course visible to offer a clear sense of the time it would

require in students' schedules. I included an introduction module with readings and videos for students to establish a basic understanding of mindfulness meditation that addressed major barriers I found through the survey. And I included one short mindfulness meditation exercise to give students the opportunity to practice sooner rather than later. This second mapping informed the prototype of *Mind-IT* for the second cycle of DBR, in which I evaluated design functionality of the online course.

Summary

The purpose of the first cycle of DBR was to inspect prior beliefs and assumptions about mindfulness meditation to determine the learning context around students' needs. The driving question of this phase was: What preconceived perceptions do higher education students have of mindfulnes meditation? Through an online survey, I gathered data about prospective users of *Mind-IT* to inform and refine the design of the intervention. Data were analyzed using descriptive statistics for the close-ended questions and content analysis for the open-ended questions, in an exploratory fashion.

Findings of this initial phase depicted that Veterinary Medicine students have some awareness of mindfulness meditation as beneficial for well-being, in particular as related to reducing stress and anxiety. Barriers aligned with the general profile of being extremely busy with both school and work as most participants pointed to time and academic overload as hindrances to their full participation in a mindfulness meditation course. Findings were used to iterate Mind-IT by shortening activities and shaping the language to present mindfulness meditation to these students.

CHAPTER V

SECOND CYCLE OF DBR

In this chapter, I present the second cycle of DBR. I describe the process of recruiting the participants, the procedures for collecting data, the sources of data used and analysis conducted, and how findings led to iterations of *Mind-IT*. The purpose of the second cycle of DBR was two-fold: (1) to explore the design features of top-rated free online applications that aim to engage individuals in mindfulness meditation, and (2) to evaluate the functionality of *Mind-IT* to engage students in practicing mindfulness meditation. The driving question of this phase was: What features in an online environment can foster individuals' engagement with mindfulness meditation?

Methods

Since mindfulness meditation has entered mainstream science discussions, many online resources have become available. Mobile applications are examples of technology to help individuals engage with mindfulness meditation. Top-rated apps could reveal some interactive design features in online environments that might be helpful in engaging individuals in meditation. Therefore, I first studied the interactive design and navigation of five mindfulness applications to identify common features that further informed the redesign of *Mind-IT*.

As important as drawing from well-rated apps, testing the design of *Mind-IT* itself with a sample of the population for which it was created provided data to improve its user experience ("User Experience Basics," n.d.). Thus, I tested the functionality of *Mind-IT*

with five students from Veterinary Medicine to identify features and usability issues and enhance the design.

I conducted both design evaluation processes to inform the refinement of *Mind-IT*. In the following sections, I explain how apps were chosen and participants were recruited in this phase, the procedures used in the evaluation, and the type of analysis employed with the collected data.

Procedures

The second phase of the DBR happened at the end of summer semester of 2018. I started this phase by reviewing five mindfulness apps to investigate common features of the interactive design and possible strategies to engage the audience. I selected these apps for evaluation because they (1) offered an introduction to mindfulness meditation, (2) were free of charge for beginners, and (3) were top-rated by users in the App Store. These criteria were an attempt to filter chosen apps to inform as much as possible the purpose and context of *Mind-IT*. Fitting these criteria were Headspace (4.9), Aura (4.9), Calm (4.8), Simple Habit (4.8), and 10% Happier (4.8).

Moreover, in this phase, I recruited five students from the School of Veterinary Medicine to test the usability of *Mind-IT* and its potential relevance and relatability. Recruitment was through direct emails sent by a professor in Veterinary Medicine to students in her laboratory, inviting them to schedule a 30-minute in-person appointment (see Appendix D). Participation was voluntary, and all five participants received a $10 gift card for their time and effort. Students' evaluative feedback and the engagement strategies found in apps informed another iteration of *Mind-IT*.

Data Sources

In the second cycle of DBR, as I reviewed the design features of existing free top-rated online applications that offered mindfulness meditation, I identified common practices for users' engagement and related them to the theoretical framework of this study. I also conducted usability evaluations of *Mind-IT*. For this, I employed two main methods of data collection that are rooted in UX design research: benchmarking and usability evaluation.

Benchmarking

A benchmark is a measure of quality that can provide a reference point for improving processes and products (Andersen & Pettersen, 1996). Benchmarking is a method to comparatively evaluate specific aspects of existing similar products to provide insight into effective practices and features of the design (The Interaction Design Foundation, 2016). In this study, my review of preexisting web-based mindfulness apps helped identify common features used to promote engagement with mindfulness meditation and how they were associated with interest development. The goal was to identify how these apps engaged their audience to practice mindfulness meditation through online technology. Common features informed the design of *Mind-IT* in terms of potentially effective practices for engagement with mindfulness meditation online.

Usability evaluation

Testing the usability of an interactive design product is a fundamental aspect of user satisfaction. The evaluation is generally individual and based on observations of the user interacting with a prototype of the design product, performing specific tasks within

the system to detect ease of use in the environment application (McLoone, Jacobson, Hegg, & Johnson, 2010). Usability evaluation can be done informally, with reduced cost, and should be present from early stages of the design process (Gothelf, 2013; Virzi, Sokolov, & Karis, 1996). In fact, Nielsen (2000) suggested that it should take no more than five users to run a useful usability test.

This evaluation served to investigate how users interacted with *Mind-IT* and to identify and fix potential technical issues (see Appendix E). Each usability test lasted 30 minutes and was conducted using a desktop computer logged into Canvas, the learning management system. A total of five participants, one at a time, used Canvas to navigate through the course from the homepage, following the designed sequence of pages and activities in the course. I asked them to verbalize their thoughts as they interacted with the course. Both screen and audio were recorded and audio was transcribed for further analysis.

Data Analysis

In this second cycle, I conducted interactive design and navigation analysis ("IA & Navigation Analysis," n.d.) of both *Mind-IT* and selected apps. By reviewing the navigation processes of existing mindfulness apps, I identified interactions they established with new users. Particularly, I identified common features used to engage newcomers in learning and practicing mindfulness meditation online. By reviewing students' interactions with *Mind-IT*, I identified the steps they took in navigating the course and the design features that they liked or that brought up confusion. I incorporated the relevant common features from mindfulness apps into *Mind-IT* and adjusted functional aspects in the course based on the feedback I received from the usability

evaluations. Combined, these interactive design and navigation analyses provided a way to improve the design of *Mind-IT* for learning and engagement.

Findings

The main research question guiding this phase was: What features in an online environment can foster individuals' engagement with mindfulness meditation? Thus, after reviewing the interactive design and navigation of mindfulness apps as well as testing the usability of *Mind-IT*, I identified functionalities for learning and practicing mindfulness meditation and refined *Mind-IT* to better fulfill its purpose of promoting students' engagement.

Evaluating Design Functionality

I investigated design features commonly used by the selected mindfulness apps as I navigated through the application as a newcomer. Each app targeted a specific audience and thus had unique interactive features that I describe later in this chapter. However, the focus of this phase was to identify features that were widely used among these apps for engaging individuals in learning and practicing mindfulness meditation. Next, I present the navigation processes and features of each mindfulness app I reviewed.

Headspace

The Headspace app received a rating as high as 4.9 out of 5 stars at the App Store when this study was being conducted (July/August 2018). The branding position adopted by Headspace was one of simplicity. Its slogan was *Meditation Made Simple* and its language and visuals were in line with it, using basic, child-like color palettes and

drawings that imbued the navigation with a sense of ease and fun (Figure 12). The app

started by setting up a user profile and asking questions about the user's level of

experience with meditation, interest in using Headspace, and best time of day for

practicing in order to make meditation a more likely habit. Finally, it suggested enabling

notifications so that Headspace could remind the user to practice. Graphics were

intentionally used to facilitate communication and reinforce the type of interaction (e.g.,

simple, fun) that Headspace aimed to establish with its users.

Figure 12

Screenshots from the few first steps of the navigation process to create a profile on Headspace
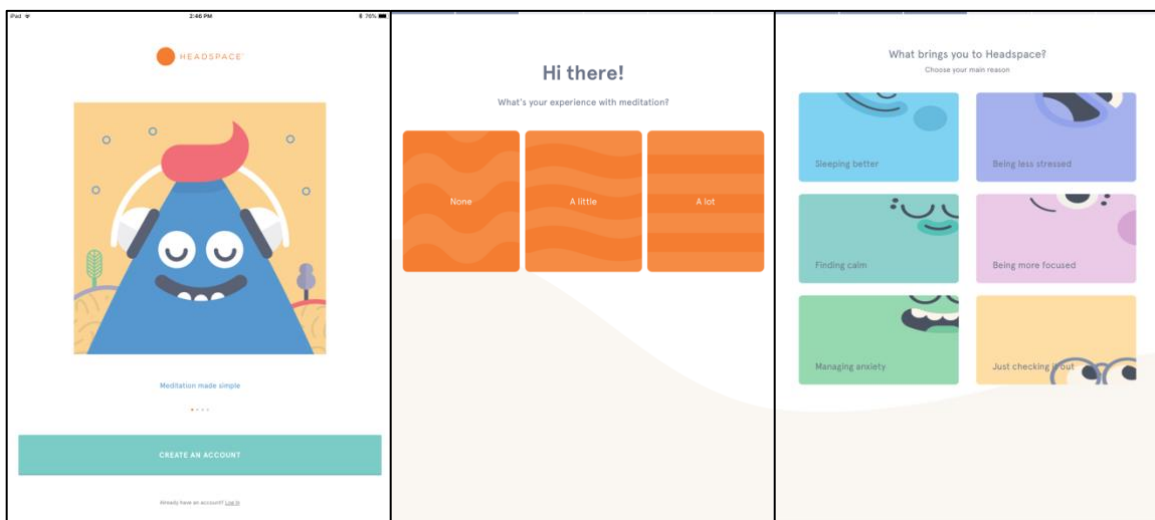
Based on the answers users gave to build a user profile, Headspace suggested an

initial duration for a meditation practice (e.g., if the user indicated none, a little, or a lot

of experience with meditation, the app suggested starting with 3-, 5-, or 10-minute

sessions, respectively) and directed the newcomer to a series of ten daily practices to

introduce the basics of meditation. Even though Headspace determined content and

duration, the app did not limit the user to the suggested path. The duration could be

modified on the spot as the user began a practice, with the possibility of making it longer or shorter depending on available options. The practices were delivered by audio, even though there were visual cues indicating the time elapsed and the time remaining. At the end of a practice, Headspace showed a number accounting for the amount of practice the user had performed thus far and a meaningful, motivational quote, which the user could share with others on social media (Figure 13).

Figure 13

Screenshots from initial steps in the navigation to start practicing meditation on Headspace
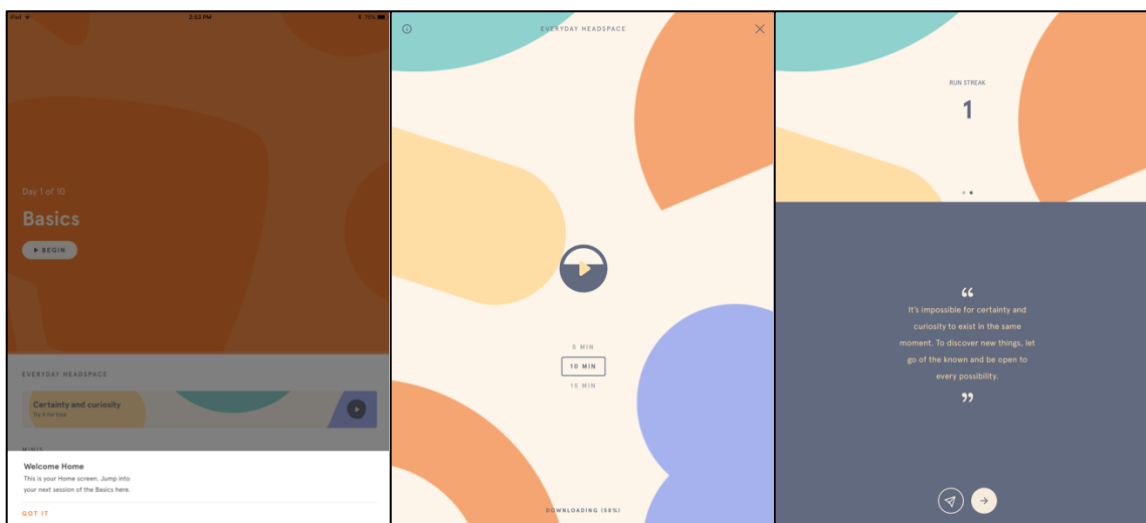
In addition to the meditation basics, the user could explore and discover other types of practices in the app, but beyond the basics it was not free of charge. For a subscription fee, Headspace offered a meditation series focusing on different user-desired outcomes such as health, courage, happiness, work performance, sports, etc. It also offered single practices of different lengths with techniques for specific purposes, such as unwinding, restoring, body scanning, and working out. Headspace included a child-focused section for children ages 5 and under to learn meditation. The app also contained

an instructional section with video animations explaining some of the concepts and common doubts about mindfulness meditation, such as changing perspective, letting go of effort, and accepting the mind, among others (Figure 14).

Figure 14

Screenshots from navigation of the Headspace content beyond the meditation basics course

Finally, the user profile page within Headspace provided the option to edit the settings. It also tried to create both a sense of private space where the user could find personal statistics of app usage and practice development (a journey), and a sense of community where the user could see the number of other users downloading the app and establish a connection (add a buddy). The statistics showed the number of days and the total time spent meditating, as well as the number of sessions completed and their average duration, which could be contrasted to user goals defined at the profile setting stage. The journey section showed the types of meditation the user had engaged with and completed, organized by category (Figure 15).

Figure 15

Screenshots from user profile navigation on the Headspace app
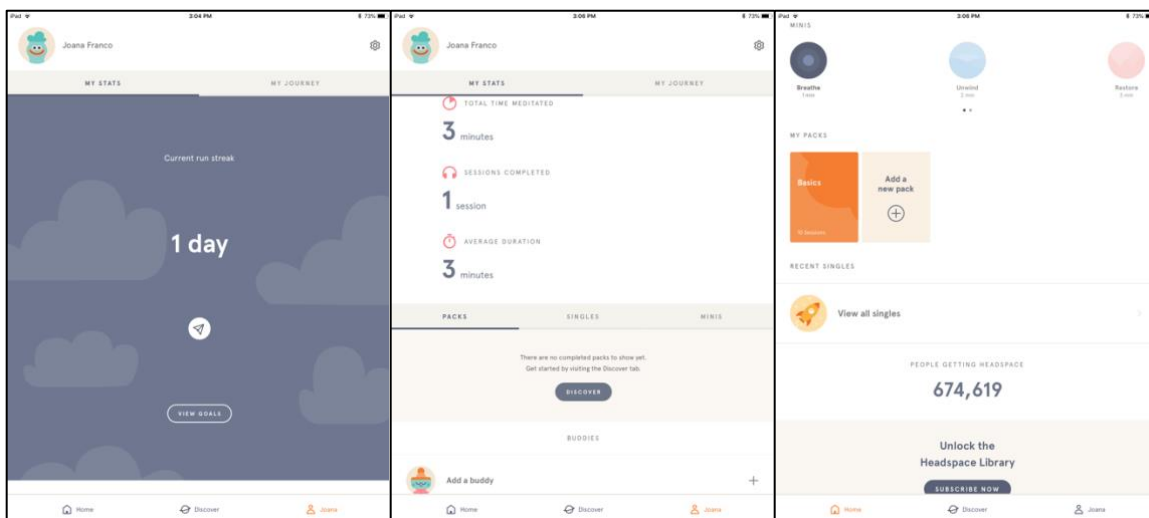
Figure 16

Flowchart of the Headspace app navigation (information architecture)
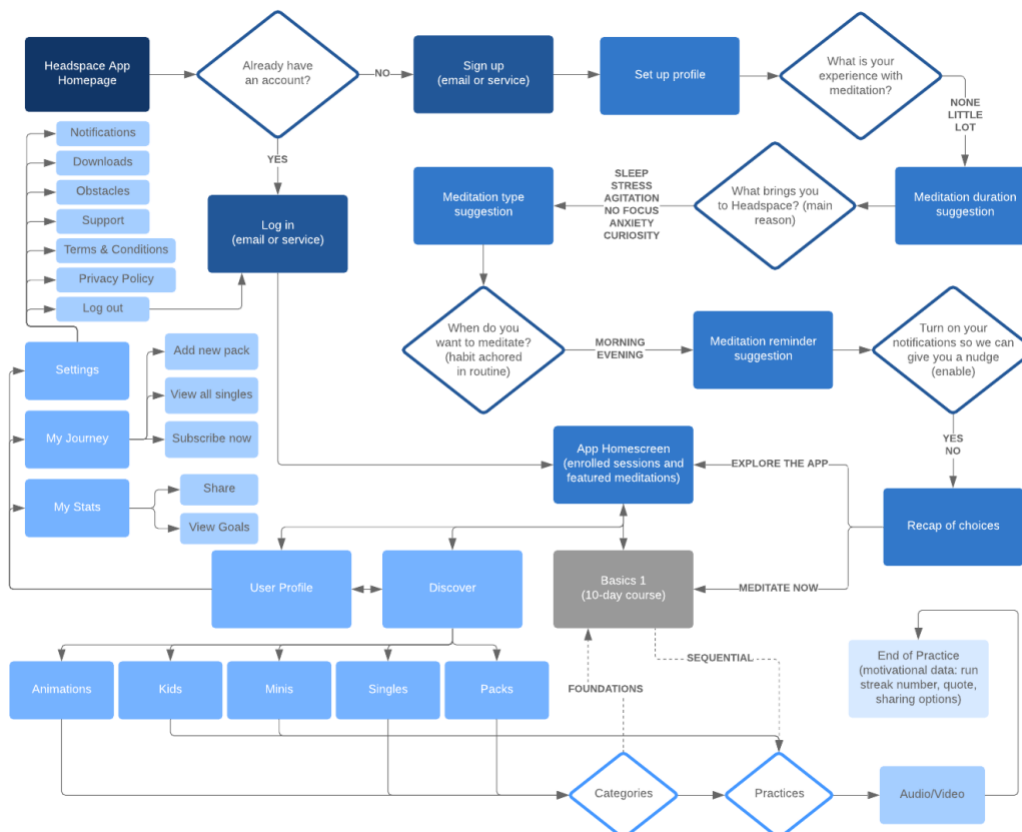
The flowchart below (Figure 16) represents the newcomer navigation process in Headspace. This blueprint of a user's interaction, known as the information architecture, lays out the interface between the person and the content in a visual model (Toms, 2002). Generally, a well-developed information architecture (IA) represents the paths and relationships within the content in terms of organization and hierarchy based on a user's mental models of that content ("Complete Beginner's Guide to Information Architecture," 2015).

Aura

The Aura app received a rating as high as 4.9 out of 5 stars at the App Store when this study was being conducted. The branding position adopted by Aura suggested that it was like therapy. The slogan said Aura was *A Personalized Mindfulness App that Understands You* and its visual interface attempted to be neutral and bring focus to the content (Figure 17).

Figure 17

Screenshots from the first steps in the navigation process to create a profile on Aura
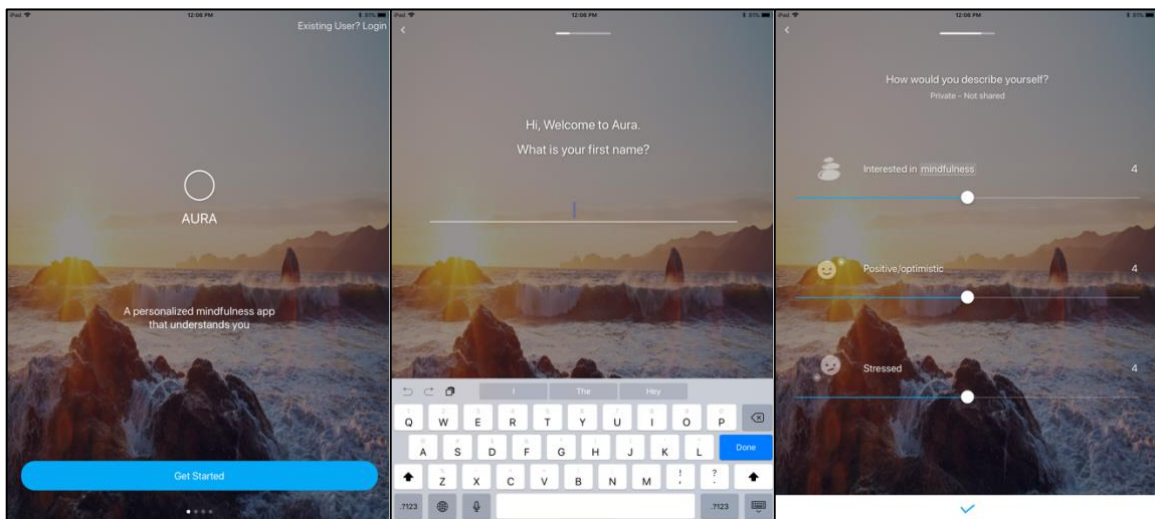
The app also started with setting up a user profile, but instead of linking with an email or a social media account immediately, it asked for the user's first name. Following the process of setting up the user profile, Aura prompted users to describe themselves in terms of interest in mindfulness meditation, optimism or positive attitude, and stress level. Next, the app attempted to help users create a daily practice, suggesting starting with 3-minute sessions tied to existing habits, such as during a commute, before bed, after showering, or while brushing teeth. Aura also suggested that the user set up notifications and receive a daily reminder to practice (Figure 18). The app indicated that the likelihood of creating the new habit would increase by 370% with reminders.

Figure 18

Screenshots from the last steps in the navigation process to create a profile on Aura
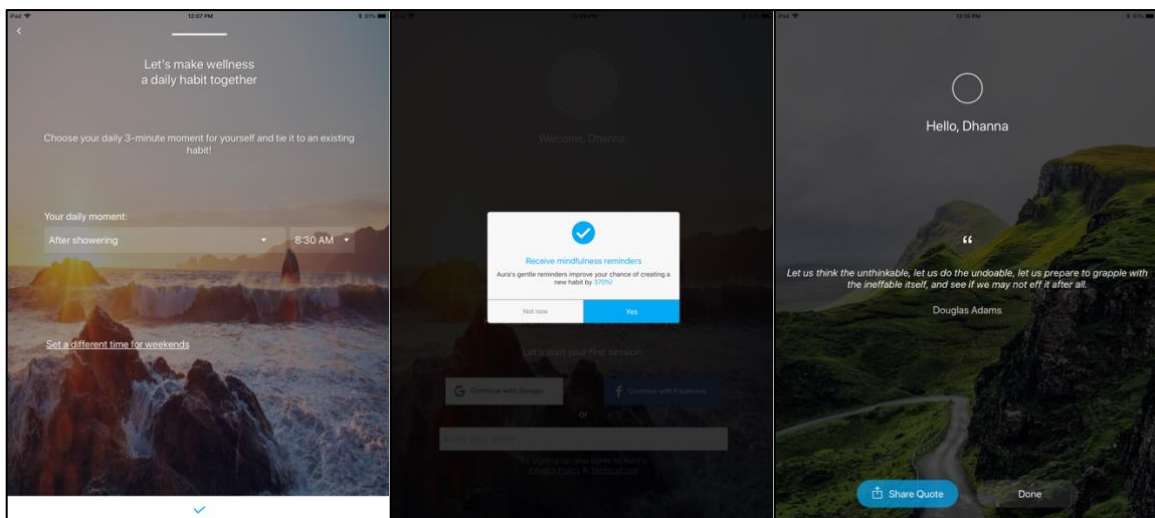
Once the profile was completed, a welcoming page allowed the new user to log in to the account and link the profile to either an email or a social media account. After the user logged in, the app greeted the newcomer with an inspirational quote, which the user could choose to share with friends.

Figure 19

Screenshots of the navigation from Aura's homepage to starting a meditation practice
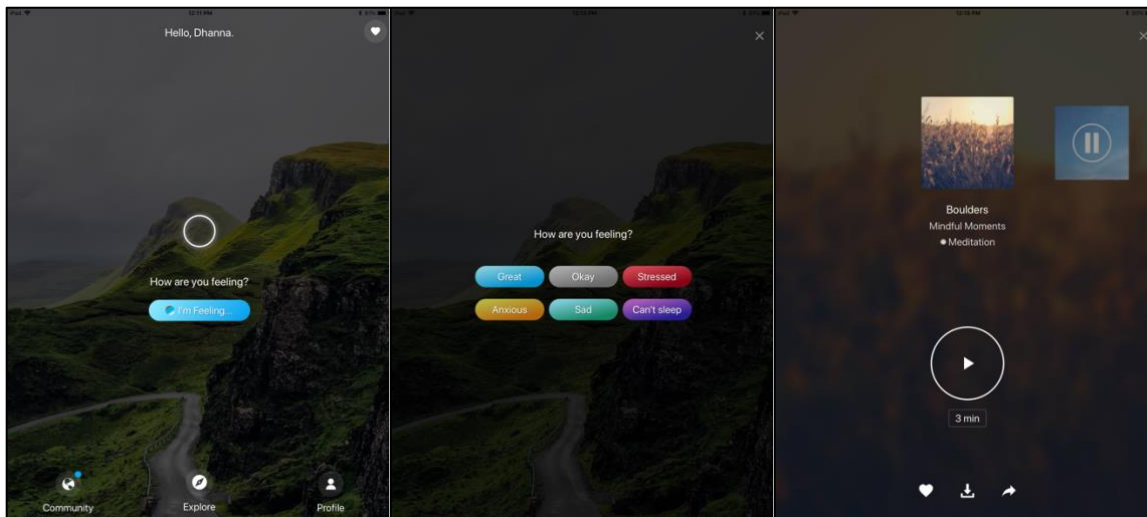
The homepage of the app staged a prompt for users to indicate how they were feeling at the moment (Figure 19). Six options were offered as responses: great, okay, stressed, anxious, sad, can't sleep.

Figure 20

Screenshots of the navigation process exploring audio options in the Aura app
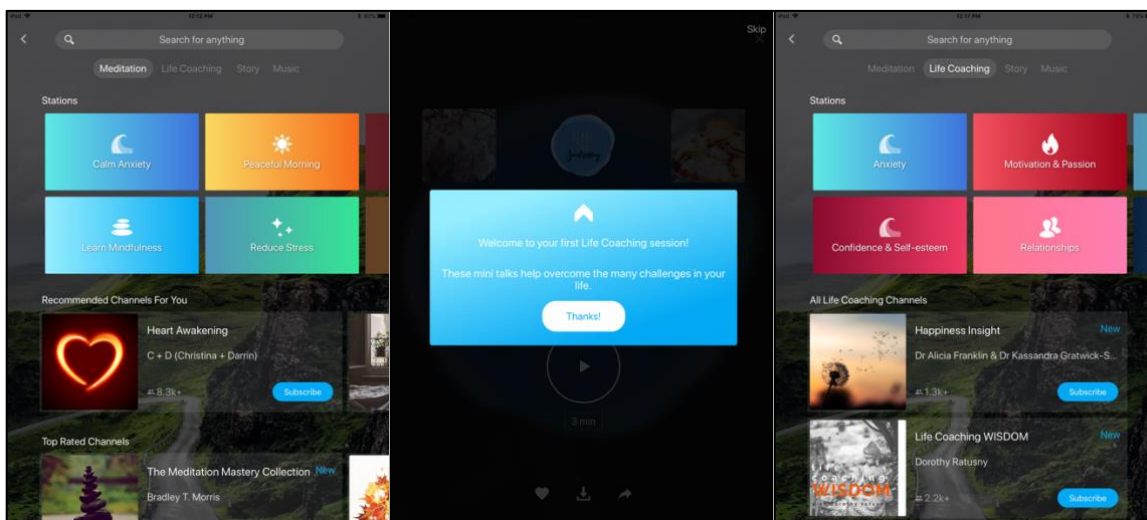
The app did not suggest a set of sequenced practices to create a foundation for mindfulness meditation. Instead, based on users' selection of their current emotional state (e.g., stressed), Aura suggested a meditation practice to address that specific feeling. Other options were available as the user explored the app.

The language used in the app was tailored to sound like therapy, and the app offered not only meditation sessions but also what it called *Life Coaching*, with audio talks on specific themes. The user could start for free with a talk on the topic of *setting goals*. Other self-help themes were available (e.g., confidence and self-esteem, relationships), but some were only for paying members of Aura (Figure 21). At the end of a practice, Aura showed the user current usage statistics, which the user could share in social media and/or with the app community, and offered an uplifting phrase to motivate continuation based on accomplishments (e.g., "Congratulations, you leveled up!"). However, to engage in another practice, the user would have to either pay for premium or wait a period of time to gain access to another audio practice.

Figure 21

Screenshots of the steps at the end of a practice in the Aura app
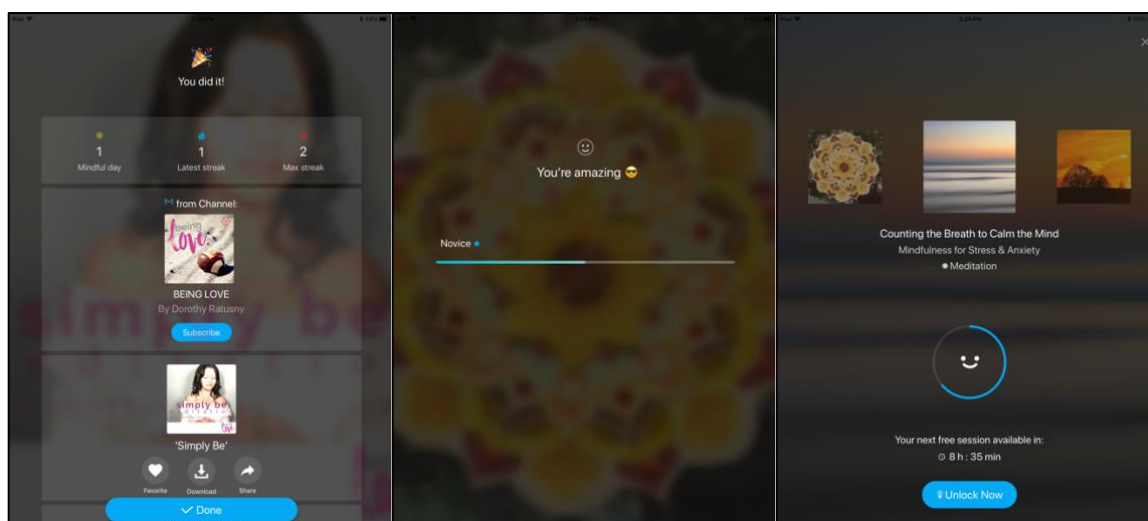
In addition to meditation and coaching, the app offered two other types of audio content: stories and music. Furthermore, there was a journaling tool that prompted the user to enter reflections and gratitude entries (Figure 22). Aura also had a section dedicated to creating and promoting an active community, with a timeline board where members could share, like, and comment on posts. Within the profile, users could track personal statistics of app usage, badges, and mood trends based on their answers to the homepage prompt, as well as access journal entries, subscribed channels, and favorite and downloaded tracks. Additionally, users could edit account settings, adjust reminders and notifications, invite friends to join the app, and get the premium version that included immediate access to all practices and additional coaching content.

Figure 22

Screenshots of the journal, community, and user profile page of the Aura app
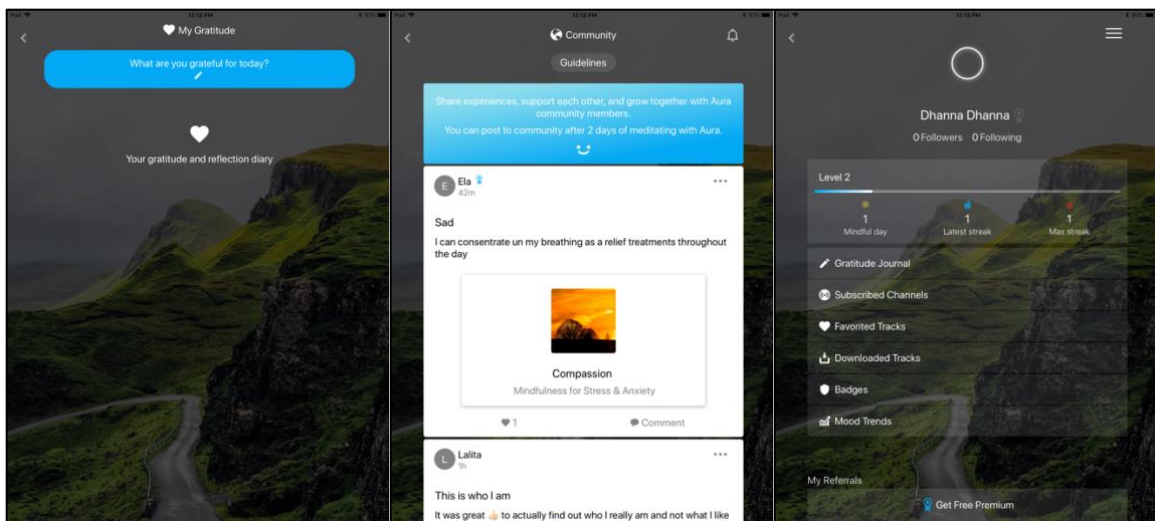
The flowchart below (Figure 23) shows the information architecture of the Aura app, with the navigation paths a newcomer encountered.

Figure 23

Flowchart of the Aura app navigation (information architecture)
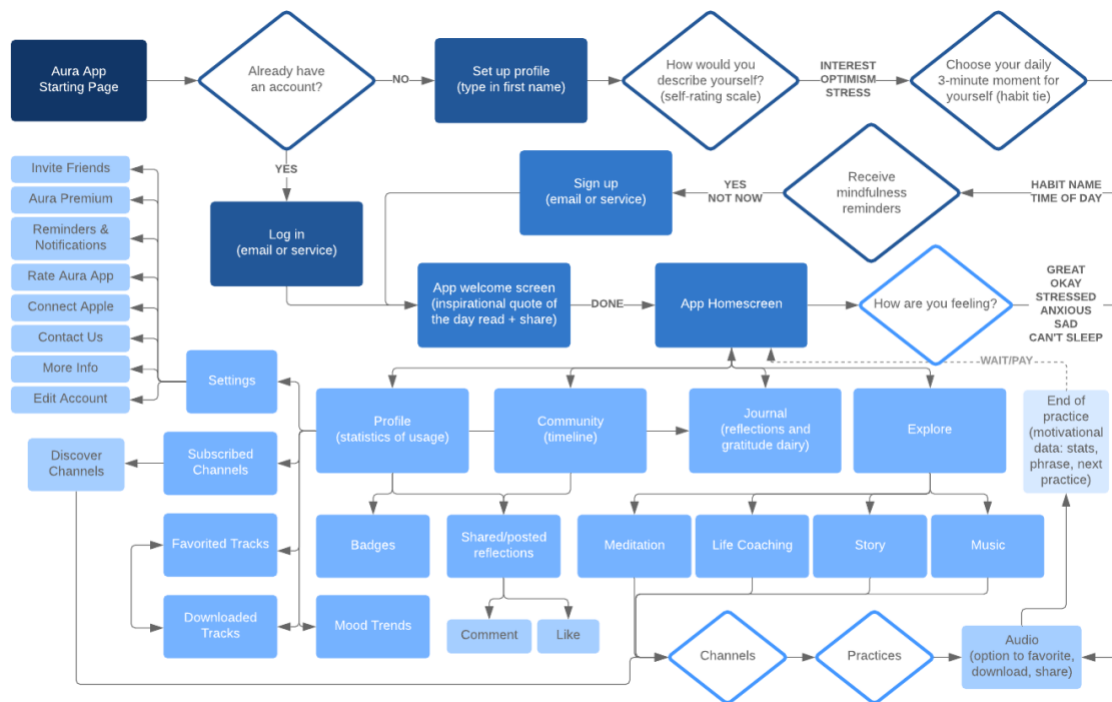
Calm

The Calm app received a rating as high as 4.8 out of 5 stars at the App Store when this study was being conducted. The branding position adopted by Calm focused on promoting serenity. The deep blue of the opening screen, and the phrase *take a deep breath* in the middle, gave the user the immediate experience of pausing. The promise of the slogan was that *Calm can change your life* and the visual interface assumed different tones of blue and images of nature in the background to communicate tranquility (Figure 24). After the brief pause, Calm took the user to set up a profile, starting with ranking goals among eight options: reduce stress, reduce anxiety, develop gratitude, have better

sleep, increase happiness, learn to meditate, build self-esteem, and improve focus. Next,

Calm asked the user to link an email or a Facebook account.

Figure 24

Screenshots from the first steps in the navigation process to create a profile on Calm
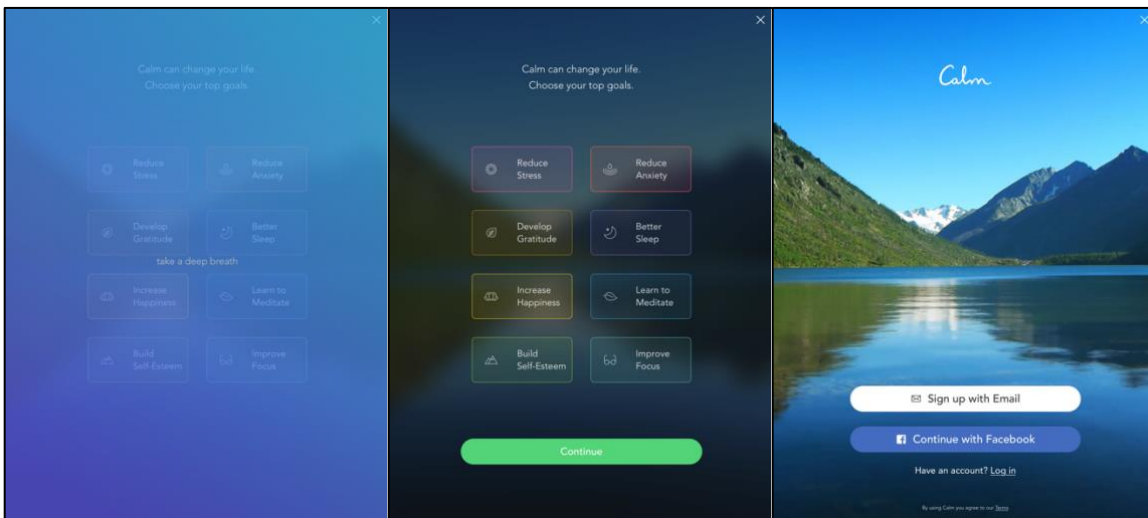
Figure 25

Screenshots from a few steps in the navigation to start practicing meditation with Calm
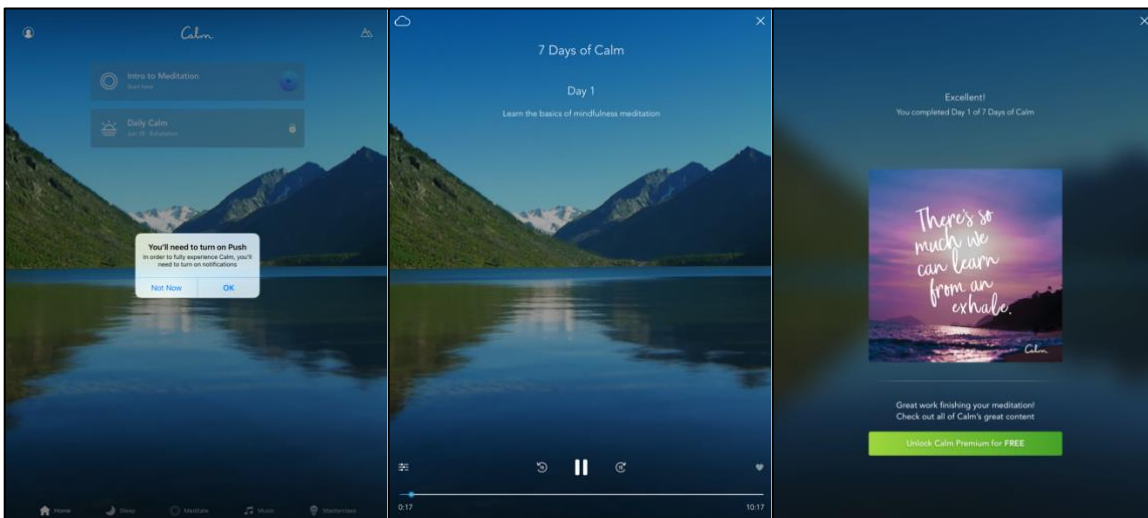
After a user logged in, the app strongly suggested turning on notifications, stating

that this was needed to fully experience Calm (Figure 25). Because learning meditation

was the first goal I selected as a newcomer, the homepage of the app featured *Intro to Meditation*, a set of seven daily audio practices to initiate the user to the topic. To unlock the other featured practice, *Daily Calm*, and other audios, the user had to buy the premium version of the app. At the end of the practice, Calm led the user to a motivational page containing a phrase for contemplation and cheerful words of accomplishment. The app emphasized the availability of more content when users purchased the premium version of Calm.

Figure 26

Screenshots from navigating parts of the profile page in the Calm app
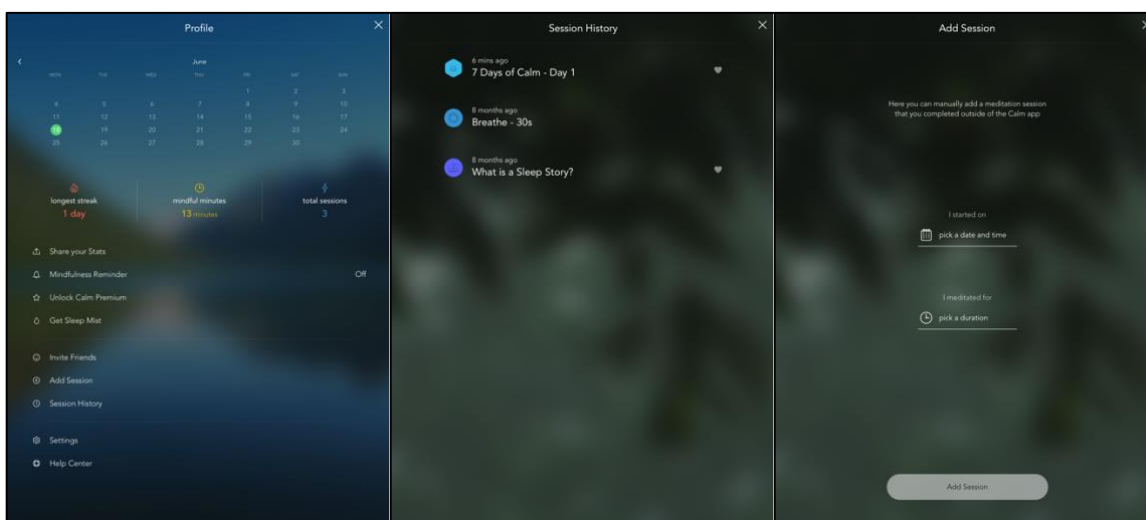
In the profile page, users could see, share, and add to their statistics of app usage. They could also invite friends to join Calm and change personal settings defined in the initial profile setup phase (Figure 26). Through navigating the main menu, the user had access to not only guided meditations and music targeting different goals (e.g., focus, relax, relationship), but also *Sleep Stories* to help with bedtime and *Masterclasses* to offer

instruction on a variety of topics (e.g., mindful eating, the four pillars of health) to apply

mindfulness meditation in daily life (Figure 27).

Figure 27

Screenshots from navigating the main menu of the Calm app
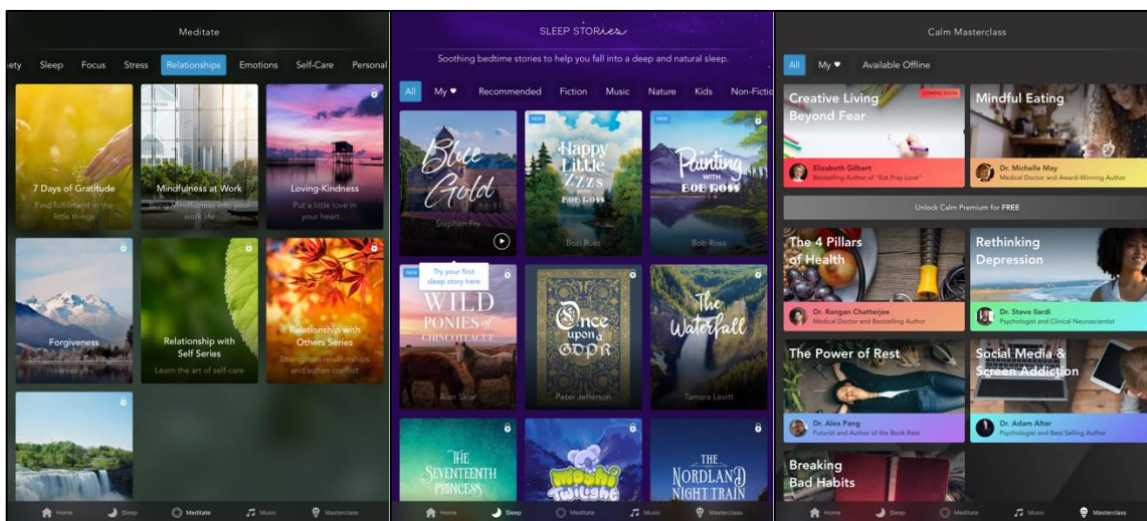
Figure 28

Flowchart of the Calm app navigation (information architecture)
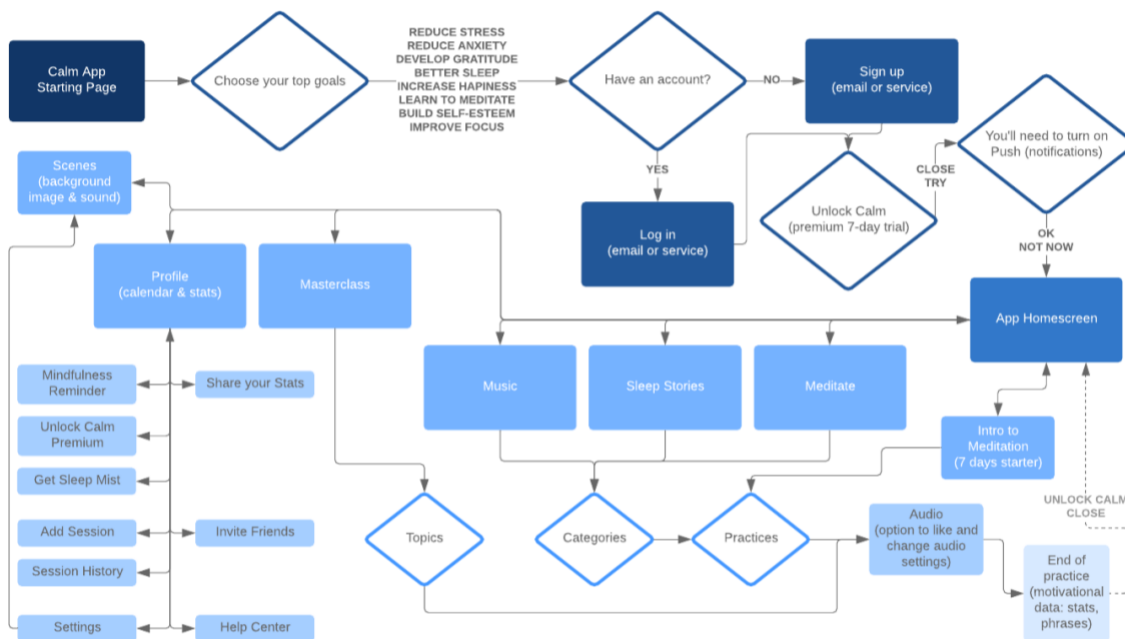
The flowchart above (Figure 28) shows the information architecture of the Calm app, with the pathways of navigation for a newcomer.

Simple Habit

The Simple Habit app received a rating as high as 4.8 out of 5 stars at the App Store when this study was being conducted. The branding targeted busy people, focusing on making meditation brief and accessible. The opening screen showed the catchphrase of the app, *5-minute meditations for busy people*, and a picture of a single flower on a light blue background. After the welcoming screen, the app led the user to get started by creating a profile to promote a personalized experience. The profile was based on questions about sleep and stress levels, as well as interest in using the app (i.e., purpose) and best time to practice. Bits of information about why to meditate and what the app offered were embedded in this process, forcing users to read the content since they had to click to continue on to the next screen (Figure 29).

Figure 29

Screenshots from first steps in the navigation process to create a profile on Simple Habit
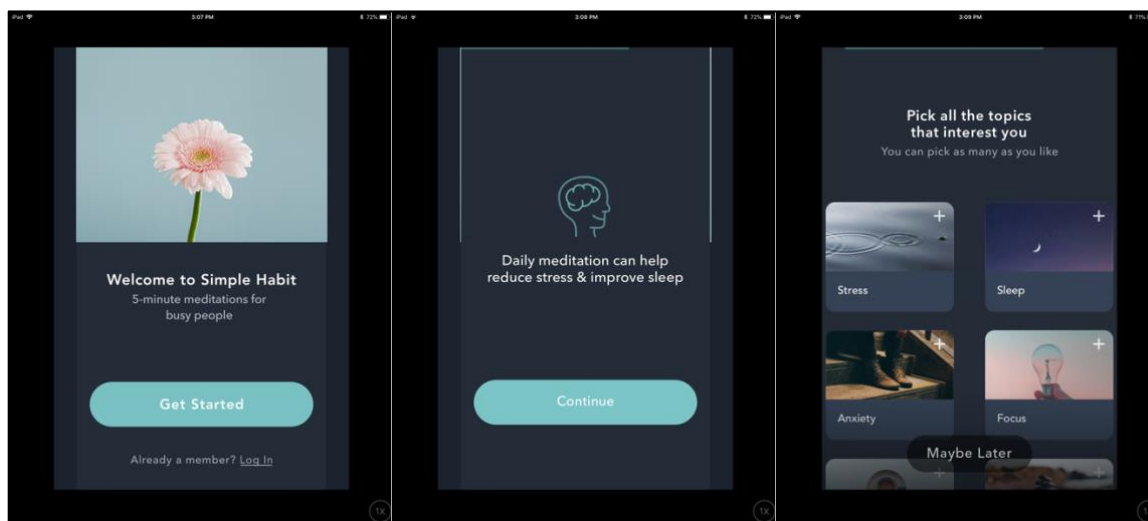
After the user selected profile preferences and linked it with either an email or a Facebook account, the app led the user to the homescreen, where it featured a recommended set of practices to start with. The app suggested a 7-day introduction to mindfulness meditation, with only 5 minutes per day of meditation. However, the app also offered meditation audios for a variety of other contexts (e.g., tough day, after work, taking a break, commute, etc.), which was named *On the go* and included the option to increase the length of the practice from 5 to up to 20 minutes (Figure 30).

Figure 30

Screenshots from a few steps in the navigation to start practicing meditation with Simple Habit
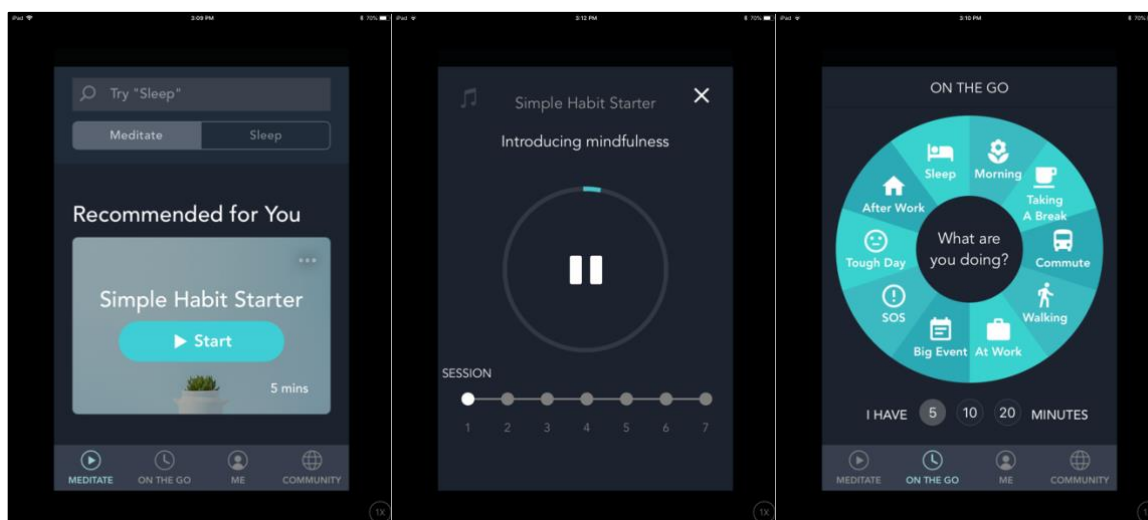
At the end of a practice, the app encouraged users to continue practicing to achieve higher levels (gamification) and showed statistics that allowed the user to track progress in the app and also share with friends (the *me* page). Back on the app homescreen, the user could also find other meditation suggestions and options, continue to the second day of practice within the recommended set, or access sleep meditations and sounds as well (Figure 31).

Figure 31

Screenshots from the after-practice navigation within the Simple Habit app
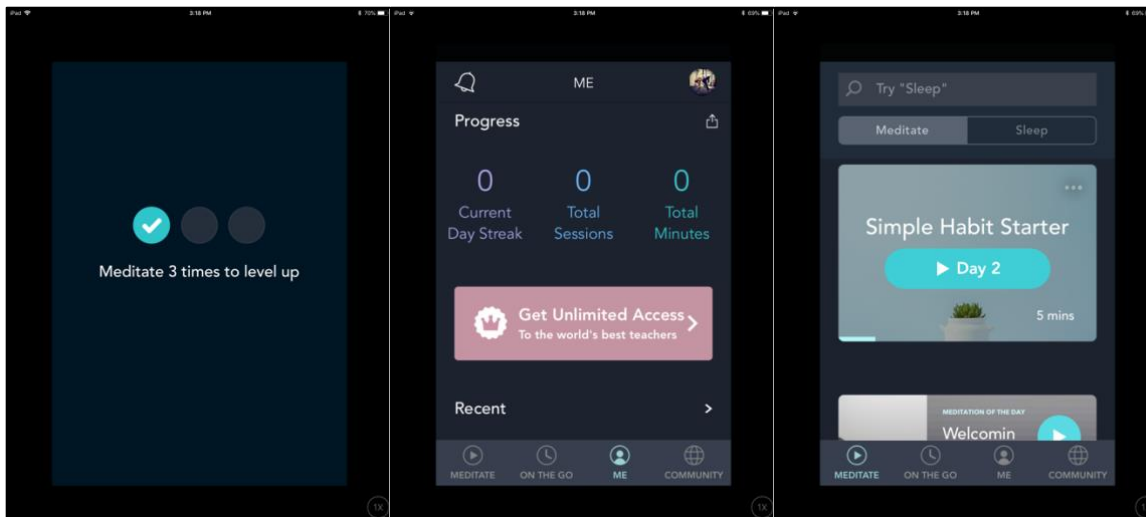
Within the Simple Habit app there was focus on building community, with a direct link to a page where the user could see current friends and their meditation statistics, invite new friends to join the app through a variety of ways (e.g., text message, email, Facebook), and engage in open challenges designed to motivate user engagement with consistent meditation (Figure 32). Each month a challenge was released, and users who joined the challenge were ranked by their minutes of meditation for that month. The ranking list showed users' name and country of origin, along with the total minutes they had meditated with the app.

On the profile page, in addition to settings adjustment, Simple Habit offered brief content called "The Science of Meditation." The page consisted of five cards presenting some facts about the benefits of meditation for different circumstances (e.g., work, health, creativity), though no reference to specific studies was offered to indicate the source of that information.

Figure 32

Screenshots from navigating the community page within the Simple Habit app
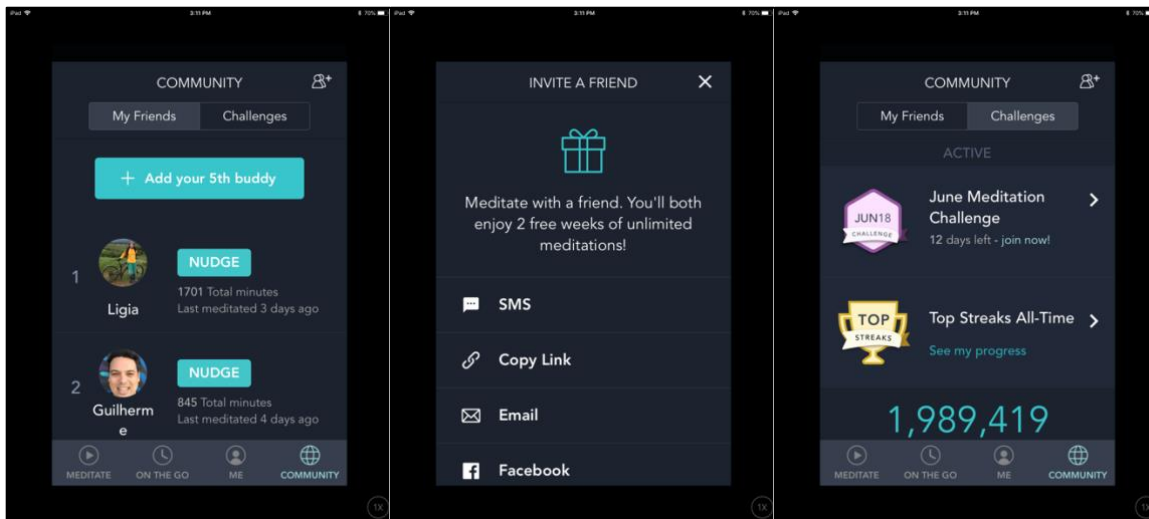
The flowchart below (Figure 33) shows the information architecture of the Simple Habit app, with navigation pathways of a new user starting to engage with it.

Figure 33

Flowchart of the Simple Habit app navigation (information architecture)
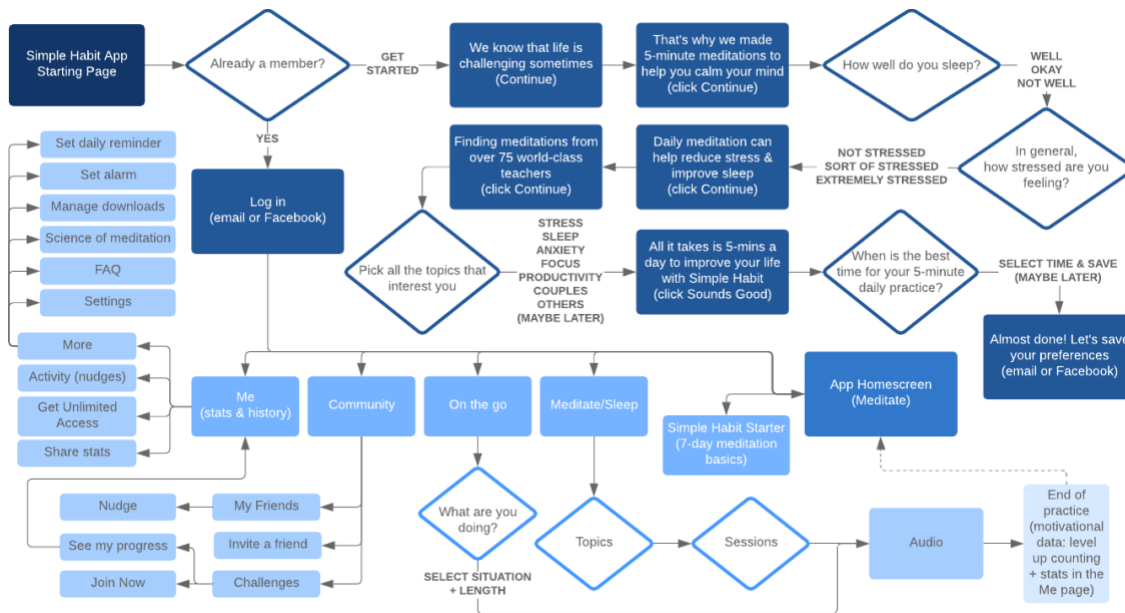
10% Happier

The 10% Happier app received a rating as high as 4.8 out of 5 stars at the App Store when this study was being conducted. The branding targeted individuals skeptical about meditation, with the slogan *Meditation for fidgety skeptics*. In contrast to the other apps, there was no personal preference setting apart from a reminder alarm (Figure 34).

Figure 34

Screenshots from the first steps in the navigation process to start with 10% Happier
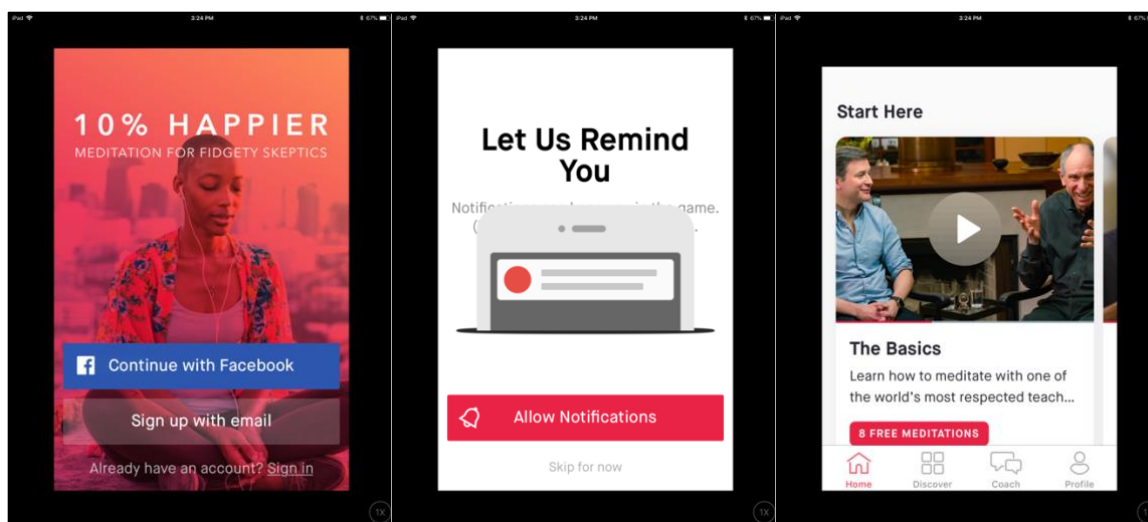
On the initial screen, 10% Happier prompted the user to create an account with either email or Facebook, then suggested allowing notifications, and jumped into a meditation basics course right away. Also in contrast to other apps, both video and audio content was offered, rather than just audio. The app design also focused on content, much like an online news page, perhaps to enhance credibility. In the free starter course, the app offered eight meditation sessions that were both informative and practical. That is, sessions had both an introductory video and a subsequent practice. In *The Basics* course, videos featured the journalist Dan Harris—who created 10% Happier—interviewing a

renowned American meditation teacher, Joseph Goldstein, about what meditation is as well as why and how to do it. The meditation audios followed, guided by the interviewed teacher, each lasting no more than 10 minutes (Figure 35).

Figure 35

Screenshots from steps in the navigation to practice meditation with 10% Happier
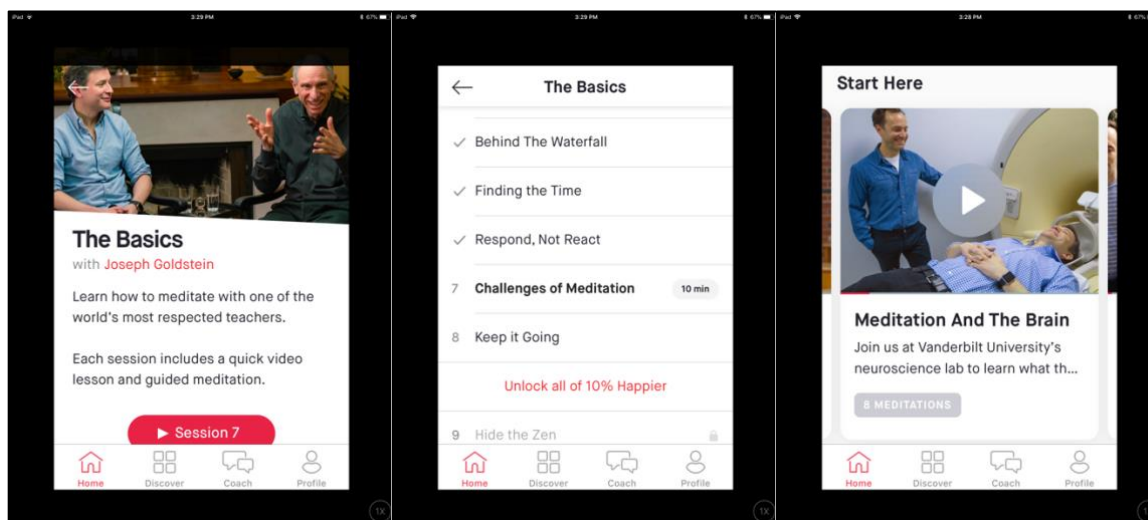
After the practice, rather than showing motivational phrases and usage statistics, the app simply showed a check mark and returned to the homescreen, where the user could continue with *The Basics* course or choose another. The focus of the app was much more informative, based on bringing forward facts and knowledgeable people to back them up.

In the first few days after a user signed up with 10% Happier, a few courses and some single meditation audios were available for free. After about two weeks, most of the content became unavaliable for non-members. *The Basics* course was still free, but to unlock more sessions or other courses and meditations, the user had to pay for the premium version.

Figure 36

Screenshots from navigating to explore the content offered by 10% Happier
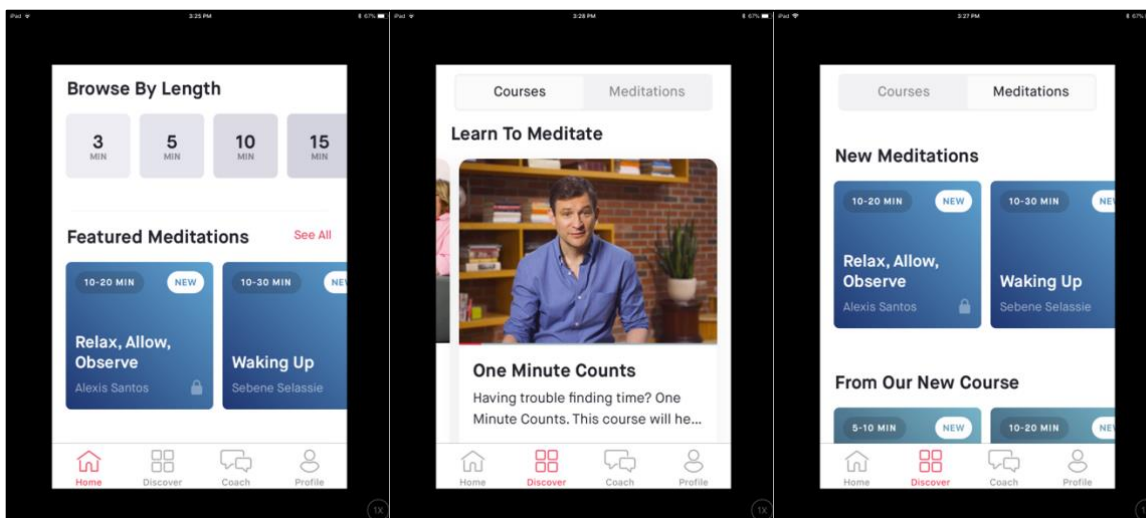
Through the app homescreen, the user could browse the featured courses and meditations and find practices by length, which ranged from three to thirty minutes. On the *Discover* page, the featured content appeared as the newest, and the app offered additional content, categorized into courses and meditations (Figure 36).

The app also provided a *Coach* program in which premium members could ask questions of experienced meditators, reinforcing the focus on being informative and having a reliable source. Within the profile page, the user had access to general statistics and the option to change the setting to cancel or allow notifications. However, unlike in other apps I reviewed in this study, a user had to become a premium member to gain access to more detailed data and to track progress (Figure 37). The flowchart below (Figure 38) shows the information architecture of the 10% Happier app, with navigation pathways of a newcomer.

Figure 37

Screenshots from the Coach and Profile pages within the 10% Happier app
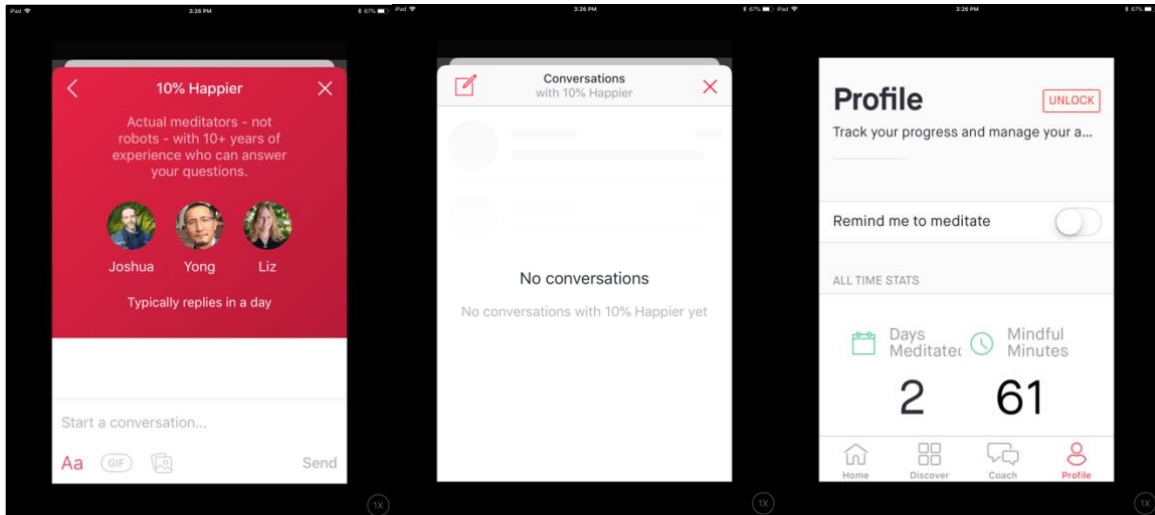
Figure 38

Flowchart of the 10% Happier app navigation (information architecture)
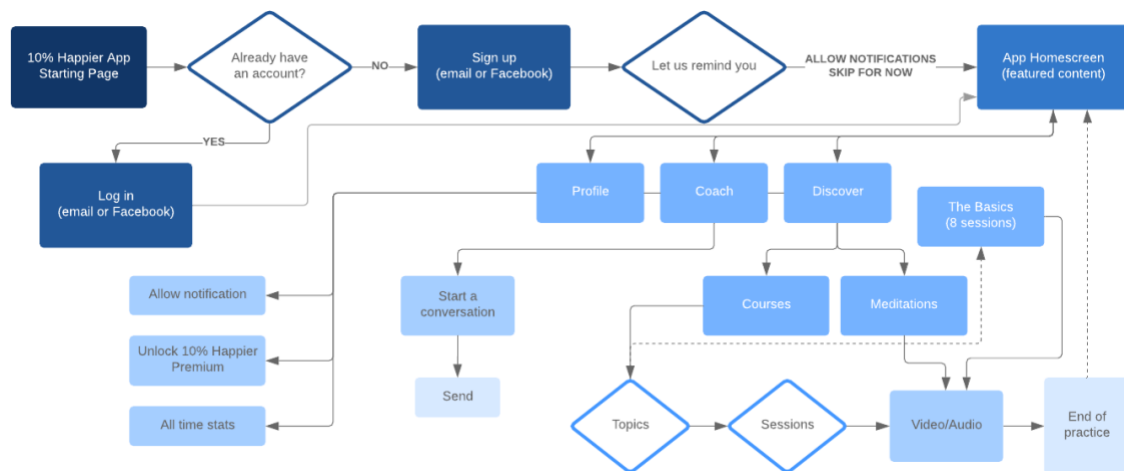
Common and Unique Design Features of Mindfulness Apps

Each app I evaluated in this phase targeted a different audience for learning

mindfulness meditation. However, it was possible to identify a few similar design

characteristics in addition to the unique features of these apps. For instance, even though

they offered a variety of meditation practices and other content, they often suggested a

linear, day-by-day practice for new users to start with as an introduction to mindfulness

meditation. All the apps asked users to allow notification to remind them to practice,

indicating the importance of consistency in incorporating and developing a new habit.

Another common aspect among the apps was personalization, even though at different

levels. Some apps asked for more personal information than others to create a profile, but

all asked for at least the individual's best time of day for setting up the reminder. As

motivational feedback for practicing, the apps offered both usage data (e.g., user

statistics, practice progression) and cheerful phrases to incentivize continuing

reengagement. Most apps also provided some level of information about the reasons for

or effects of meditation. Finally, these apps all organized the meditation audios into

categories to offer the option of practicing to fit a specific goal (e.g., reduce stress,

improve sleep) and/or time (i.e., different lengths). Table 4 compares the apps to

highlight the common interactive design features and their consistency across the

reviewed apps.

Table 4

Comparison of interactive design features among mindfulness meditation apps

App	Purpose	Interactive Design Features						
		Personal Profile	Alarm Setting	Starting Practice	Practice Options	Incentive Feedback	Usage Data	Inside Community
Headspace	Make meditation simple to practice	*	*	*	*	*	*	
Aura	Offer meditation as a tool for self-growth	*	*		*	*	*	*

App	Purpose							
Calm	Offer meditation as a tool for life change	*	*	*	*	*	*	
Simple Habit	Make meditation accessible to busy people	*	*	*	*	*	*	*
10% Happier	Present meditation to skeptics		*	*	*		*	

In terms of unique features, the apps used different types of visual and verbal communication depending on their purpose and audience. While some apps offered sleep stories in addition to mindfulness meditation, others had tools for individual journaling, for sharing and cultivating community, for learning (e.g., courses and masterclasses), and for getting support (e.g., coaching). The amount and type of information offered to users also aligned with the different purposes of the apps. For example, most meditations in 10% Happier were accompanied by material to inform the user about how and why to meditate from a variety of perspectives, whereas in Simple Habit the information was more hidden and the meditations were separate from it.

Usability Evaluation of *Mind-IT*

In addition to benchmarking mindfulness apps, I conducted usability evaluations of *Mind-IT* with five students from the target audience of this study. In the evaluations, each participant navigated through the course, following it from beginning to end and giving feedback on aspects such as clarity of the instructions, ease of use of the modules, and relevance and appropriateness of the content. I asked them to talk out loud while

navigating the course to identify their thought processes while interacting with *Mind-IT*.

At the end of each evaluation, I prompted participants with usability questions (see

Appendix E). Next, I describe what the participants liked about *Mind-IT* and what they

felt was not clear and needed improvement.

Positive evaluations of *Mind-IT* design features

The course was designed to be sequential and provide linear navigation for users.

When I asked participants at the end about the ease of use of *Mind-IT*, all of them

confirmed it was easy to find information and follow the instructions to complete the

tasks in the course. One participant noted the directions were "pretty straight, like, self-

explanatory." Another participant mentioned liking "how, as long as [you] read

everything, all the instructions are there, which is nice." They generally valued the

structure used to segment the content into topics and categories. Another participant said,

"I like on this page all the headings are in green, which makes it very clear how it's all

split up."

Some participants also mentioned they appreciated the way the content was

verbally presented. That is, the language and media used to explain mindfulness

meditation made it simple to understand and relatable, connecting to students' everyday

experiences. A participant said: "I like how it was all written. And it made me want to be

more mindful the way it was written. I enjoyed that." Another participant said, "I like

how there is videos interjected because I get bored of just reading all the time." Overall,

participants perceived *Mind-IT* to be just right for their context and for accommodating

their tight schedule and time worries. For example, when I asked what they would modify

in the course if they could, participants did not suggest any major change and confirmed

that offering it at the beginning of the academic year would be great timing. One

participant said:

> I think it was great. Honestly, I don't think it was too long or too short. I thought it
> was the right length. And, like, all the videos that you had in there, all the
> different mindfulness things that you can do. You had tons of it, so that was great,
> 'cause people are gonna want different things. So, having all those different
> options was really good.

Participants' comments generally confirmed that Veterinary Medicine students

have barriers to engaging with mindfulness meditation. One participant mentioned:

"knowing my classmates and the other, my other peers who are going to Vet Med, I don't

think, not everyone will be fully into doing this. And they might just take it as a joke." He

also said that even if they knew mindfulness meditation was supposed to be good for

them, they might not be interested in practicing, especially if they did not perceive

themselves as overwhelmingly stressed.

From participants' comments, *Mind-IT* nonetheless seemed to have addressed

students' main barriers toward mindfulness and helped them develop interest in engaging.

I asked participants at the end of the usability evaluation about their prior experience and

whether they thought *Mind-IT* could be a good start for students in Veterinary Medicine.

One participant answered, "[I tried mindfulness] a little bit, yeah. But I think you piqued

my interest more through this course." He also said, "Oh yeah, all these different videos!

Like, experience your food! It's like, what's that talking about? So, yeah, I think it will be

good. I like that. I'd like to actually go through it, it can be nice to go through."

In line with the model of interest development, offering a variety of options for

students to choose from and tying in with students' existing interests seemed to have

triggered their situational interest in engaging with mindfulness meditation. One

participant mentioned, "So having all those different options was really good." Another

participant revealed that even though he had some idea about mindfulness meditation, he

had never seen such a variety of practices, and "that's why [he] really enjoyed those

examples." Yet another participant said, "I feel like people would be interested in, like,

these videos." She continued:

> I like these [pointing to practices with dogs and horses] […] that's definitely like, I feel, like, it's things that Vet students won't just be like, oh, like, mindfulness while you exercise. Like, it's something that's more interesting to, like, what they like to do. And I think because this is like, options, I don't think this one's too long. I think this one is good. Because it's, you know, like, you're not asking them to, like, read everything, you know, you just pick one of them. So, it's like, having them all on the same page I think that's good. And then you have, like, different categories.

Another important point of *Mind-IT* was to prompt students' personal reflections

about mindfulness to facilitate relatedness and, consequently, interest development.

Additionally, the prompts were aimed to show the progression in students' perspectives

about mindfulness as they went through the course. Overall, participants identified the

prompts as helpful in creating personal connection. One participant said: "So, I like how,

yeah, you're already addressing that [personal reflection on mindfulness] to see if that

will be helpful to them individually." Another participant said: "So, like, you have this

question here, and kind of rephrased but the same question in the end, and I like that. I

like because you can compare here." Yet another participant mentioned:

> I do like how [the prompts are], like, what kind of challenges do you imagine you'll face, because then that you don't really get into, it's, it's more so... Personally, for me, what I would write about is that I knew about, like, the tuition, the amount of tuition it would cost, and then the debt I would have, higher rates of suicide, things like that. I knew about it, and I was ready to talk about it during interviews. So, besides that, it's not necessarily personalized to me. So, I think it would be kind of good for me to think about it, how it would affect me, how do I address it, versus, Oh, I know it's there and I know it's a problem. But you go a little deeper than that. So, I do like that prompt.

All in all, participants who evaluated the usability of Mind-IT appeared to like the flow of the course and perceive the activities as interesting and suitable to the students' time and context in Veterinary Medicine. However, a few elements of the navigation and the content of *Mind-IT* were less clear, and participants suggested ways to improve them.

Design features in *Mind-IT* that needed improvement

The first lesson from the usability evaluations was that options were important, but should not be overwhelming. Some elements in the content and navigation were taking away from the users' ability to focus on what was relevant. For example, the calendar on the homepage tried to convey too much information at once and ended up confusing participants rather than helping. Although the overall process of going through the course was perceived as easy, there was confusion on how to proceed from the homepage due to a variety of link options to click to move forward (i.e., *Next* button at the end of the page, inline text link, and menu at the bottom of the homepage with links to all modules). Participants echoed that they were not sure where they were supposed to click, which created some hesitation to move forward. Once they clicked on one link and then came back and clicked on the other, they noticed that all links led to the same page and they simply chose to click on whichever one made more sense to them to keep going. Finally, in terms of excessive information, even though scientific evidence had value, cluttering the content with references was perceived as negative to the reading flow. In one participant's words:

> I know it is useful to, to reference that specific one to what you're talking about. But then you also list those references again at the bottom. So, it might just make it easier to reference if you put just like a number rather than the whole parentheses, if that makes sense. My eyes automatically skip over the parentheses.

If I had something that I want to look out and I can go to number one or number two, down here at the bottom, maybe. It makes it a little bit shorter.

Just as the overload of content and options can become an impairment to a fluid learning process, so can the lack of easy, direct, and clear access to content and options. Participants in the usability evaluation pointed out some pages of *Mind-IT* that they felt should be more easily available to go back to at different times, outside the linear flow of the course. For example, one participant suggested making it possible to contact the instructor from pages other than the homepage alone, in particular from pages containing assignments, since that is when students might have questions and want to contact the instructor. The same participant also suggested including a direct link to the discussion board to be accessed from any page, "just because I feel like that would be something people would be going back to more frequently versus like having to click through." The same was felt about the *Mindfulness Practices* page, which contained audios and videos for the different meditation exercises. Moreover, some participants indicated it would be helpful to remind students to keep returning to that page to practice after the two-week period of the *Mind-IT* course. As a participant stated, "I took this course, I understand what I can do with mindfulness and all these resources that were handed to me, [but] I'd forget, to be honest." Finally, in terms of making content available, one participant noted that even though being online might make it easier for students to fit mindfulness in their schedule, he would have liked to have an option for face-to-face practice as well, especially because he would appreciate direct feedback and community. As he said:

> Just being in a classroom and talking about it might, would be beneficial too, but I, like, with their schedule, I don't know when you would fit that in. But, yeah, like, if, if you're doing yoga, in a classroom full of yoga, like other people doing yoga, it kind of makes you feel like doing that activity more, I think. But when it's

on you, personally, I'd be like, I don't know what I'm doing. This is wrong. I don't, it's probably not right.

Participants had different opinions about the discussion board requirements. Some perceived it was important to give very specific directions about how to engage in discussions and to set a minimum number of replies to peer posts, even more than I had suggested on the discussion board. Others argued that discussion should be free of any direction so as to induce a more authentic conversation. To promote a balance between unconstrained speech and directed discourse, some direction seemed to be necessary to induce thoughtful discussion. As one participant shared from his online learning experience, "it was definitely helpful to have that requirement or else not a lot of people would have commented, but it did provoke a lot of good discussion."

Limitation of *Mind-IT* despite design features

In the usability evaluations, as participants talked out loud, they commented on aspects of engagement with the course that were not necessarily related to design features. Mostly, they commented that a mindfulness practice would not be students' priority compared to other tasks in courses that were required in the program. Participants acknowledged that the lack of time for something that was not a priority could make students stop engaging with *Mind-IT*. One participant said, "Oh, I'd really like to [try a mindfulness practice]. But I would definitely, like, after that 'Click Yes,' see the schedule, before really compromising with it."

The time worry was a barrier found in the first phase of this DBR. Thus, *Mind-IT* offered options to engage in brief mindfulness practices. In addition to promoting understanding of and personal connection with mindfulness, the option to engage in short

rather than long meditations might help students reengage. In *Mind-IT*, I curated a selection of meditation exercises that varied from a one minute all the way to 15 and even 30 minutes. Next, I present the second iteration of *Mind-IT* that resulted from both the review of mindfulness apps and the usability evaluations described above.

<div align="center">

Iterations

</div>

The second iteration of *Mind-IT* took place as I identified design characteristics of the interaction and navigation patterns of top-rated mindfulness apps, as well as tested the first prototype of *Mind-IT* with a set of potential users. Lessons learned about important design features for introducing mindfulness meditation to beginners and how they informed *Mind-IT* are described next.

How Design Features of Apps Informed *Mind-IT*

Among the common design characteristics used to introduce mindfulness meditation to individuals, setting a notification to remind users to practice on a regular basis was unanimous and done similarly by all apps. *Mind-IT* was initially designed to notify students of assignments, but not to continue to notify them to practice after the two-week period of the course. The plan was to allow students to retain access to the curated mindfulness practices in *Mind-IT* throughout the semester, but not to remind them to engage. The notification setting to remind individuals to practice was aligned with the four-phase model of interest development in that when interest is still in its initial phase of development (i.e., situational), reengagement is not yet autonomous and needs prompting (Renninger & Hidi, 2016). Only when a person's interest becomes well-developed is reengagement with the topic of interest self-regulated. So, a reminder to

reengage with mindfulness meditation after the two weeks of introduction was included in the redesign of *Mind-IT*.

Another element that was consistent across apps was providing usage data, even though not all apps showed users the same kind and amount of data. The purpose of sharing individuals' data was to establish a sense of progress and serve as motivation to continue practicing. In addition to user statistics, cheerful phrases and motivational quotes were common ways to incentivize individuals to come back and keep reengaging. Unlike mindfulness apps, *Mind-IT* did not intend to promote itself as a product for constant use. Rather, the goal was to introduce mindfulness in a way that allowed for perspective change—normalizing the practice to reduce barriers to engagement—and interest development, such that students could choose to practice for themselves, not due to external motives. The focus on data usage would not fulfil the purpose of *Mind-IT* and I did not adopt it. In fact, some research debates whether some design features of mindfulness technologies align or conflict with individuals' motivation to engage in meditation (Little, 2016). However, offering feedback in honest appreciation of students' efforts might encourage them to reengage, which is especially helpful in the initial stages of interest development (Renninger & Hidi, 2011; Renninger & Su, 2012). Therefore, I incorporated this motivational feedback on students' writing assignments as a way to recognize their efforts and possibly support their situational interest in mindfulness.

Personalization was another design aspect common to all apps, even though at different levels. This feature was already present in *Mind-IT* in the reflection prompts in the writing assignments, since establishing personal connection with the topic has been linked to triggering situational interest (Renninger & Hidi, 2016). Personalization,

however, confirmed the design choice to provide motivational feedback individually to the students in response to their narratives, since it might boost their sense of personalized interaction.

Another common design feature was the linear set of practices to introduce mindfulness meditation. Although *Mind-IT* was set up to be a linear course and the first suggested practice was the same breathing meditation offered to all students, the purpose of this study with *Mind-IT* was to trigger interest, not necessarily to teach mindfulness. Thus, rather than suggesting a set of practices to learn the foundations of mindfulness meditation, having students choose the meditation exercise was more important to reinforce personal connection and situational interest. Nonetheless, I included in the list of options in *Mind-IT* a set of practices categorized as *Basic Mindfulness* to serve as foundational exercises in case students were interested in learning that.

Similar to all apps reviewed in the study, *Mind-IT* organized the meditation exercises into categories. However, most categories in *Mind-IT* were related to topics that were meaningful to students in Veterinary Medicine (e.g., mindfulness with animals, mindfulness for stress reduction and well-being, mindfulness for focused attention and performance). The categories were defined based on data from the first phase of this DBR. In addition to the meaningful topics derived from prior interests and perceptions of mindfulness meditation, *Mind-IT* offered a category of brief meditations to allow students to practice even if they perceived time as a barrier.

Information about reasons to meditate and/or benefits of meditation was offered at various levels among apps. Because *Mind-IT* aimed specifically to shift perspective, providing information and promoting science-based discussion was an integral part of its

instructional design. Similar to the 10% Happier app, *Mind-IT* tried to demystify

mindfulness meditation and address the main barriers identified in the first phase of the

study. Offering information that students would perceive as valid, even when different

from their initial views, was crucial to create a space for transformative learning.

Finally, supporting an inside community was common to some of the mindfulness

apps, but not all of them. Based on prior conversations with a professor in Veterinary

Medicine, students might feel uncomfortable talking about their experiences and

emotions in a collective setting, which could prevent their engagement. To allow for

transformative learning, *Mind-IT* needed to be a safe space for students; thus, I did not

aim to establish community through the course immediately. I limited the sense of

community to only the discussion board assignment, where the content shared was based

on scientific evidence regarding mindfulness rather than personal experience. However,

to instill relatedness and meaning to the discussed topic, students were prompted to

search for articles to share on issues common to general Veterinary Medicine students.

How Users' Feedback Informed *Mind-IT*

From the usability evaluations, I identified areas in *Mind-IT* that needed

decluttering and clarity. For example, on the homepage I deleted the bottom menu with

links to all the modules, because that seemed to just add confusion to the navigation. I

kept the *Next* and *Previous* bottom buttons that allowed for linear navigation. I kept the

inline text links as well, because they explained what the link was about and gave a sense

of what was next. However, I added a top menu to all pages of *Mind-IT* with shortcuts to

content that was important so students had easy access to it, independent of linear

navigation (e.g., start here, modules, instructor, mindfulness practices). Also, in the left-

hand side menu that comes with any course built on Canvas, I left visible only the links that would be meaningful for students (i.e., announcements, discussions, and modules).

To further declutter the content, I created a separate page to contain all the references used to give legitimacy to the content, and within the text I used only numbers to indicate the source, in case students felt compelled to read more about it. That reduced the noise on the content page but still allowed scientific validation of what was being said in *Mind-IT*. Finally, I also cleaned the calendar view on the homepage. The calendar offered a timeline of the two weeks of the course but tried to convey too much information at once. I simplified it by showing just the days and names of activities planned for each day. The names also linked to the page of the activity, but because the course was set up to be linear, students could access the content only in sequential order.

During the usability evaluations I confirmed that adding a reminder to continue practicing mindfulness meditation was important in the redesign of *Mind-IT*. What is more, based on students' feedback, I decided that notifications would not be daily, as in the apps, but weekly. Daily notification was overwhelming to students, while once a week seemed to be enough to remind them to reengage in the midst of a demanding routine. Receiving the weekly reminder after the two weeks for the rest of the semester was still a choice, and if students did not opt in they were not going to be part of the group receiving the reminders.

Finally, one participant suggested that face-to-face meditation could be beneficial, but in addition to the lack of a physical space in which to meet, the logistics of meeting in person would have required more than the scope of an online course. To still honor the feedback and remain within the online setting, I included in the list of mindfulness

practices an option to meditate live with me, the course instructor, through a videoconference tool. I looked at students' school calendar and found the periods they would potentially be free on the last Friday of the two-week course. Throughout those periods, I offered a few online 15-minute meetings that students could sign up for. I organized the videoconference meeting to be a 10-minute meditation practice followed by 5 minutes of Q&A, in case students had doubts or wanted feedback.

These design evaluations were conducted to answer the second question posed in this study: What features in an online environment can foster individuals' engagement with mindfulness meditation? Findings from the analysis of the navigation and interactive design of both the apps and the prototype of *Mind-IT* helped advance the design of *Mind-IT* to introduce mindfulness meditation to students in Veterinary Medicine.

Figure 39

Third conjecture map adjusted based on design evaluations of apps and Mind-IT
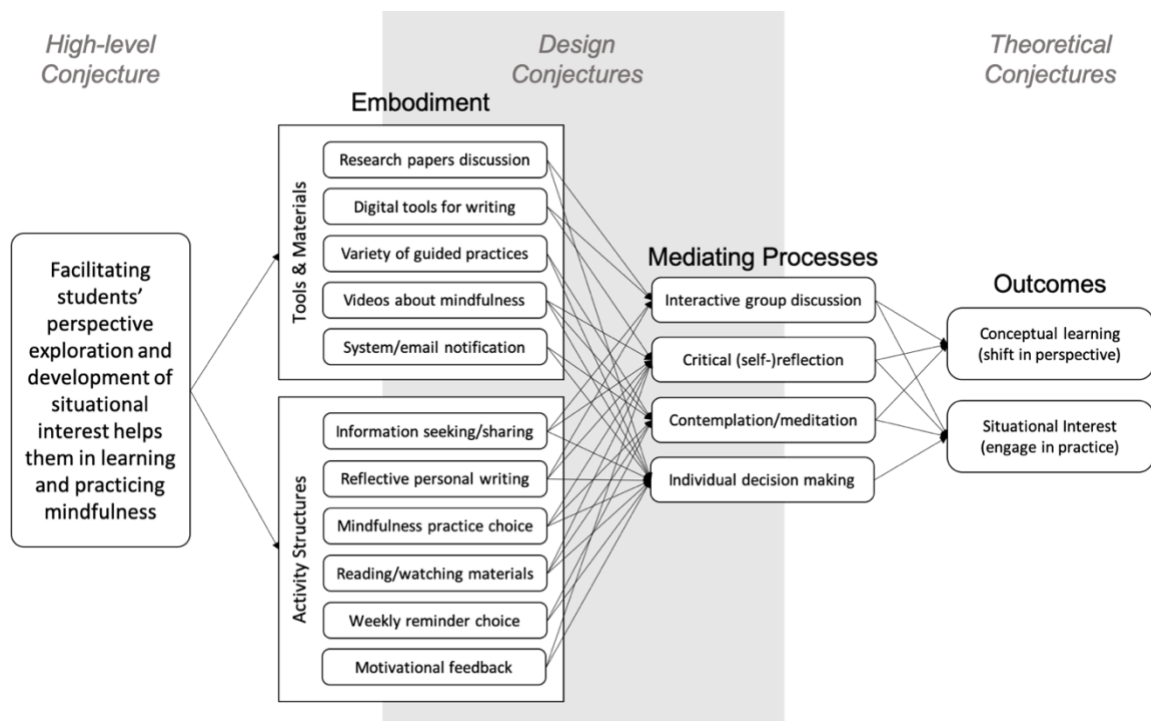
After analyzing these design functionalities in the second cycle of DBR, I adjusted the conjecture map to depict the revised relationships between conjectures (Figure 39). This third mapping informed the design of *Mind-IT* for the third cycle of DBR, in which I piloted the course with students in the incoming cohort of Veterinary Medicine.

Summary

The purpose of the second cycle of DBR was two-fold: to explore the design features of top-rated free online applications that aim to engage individuals in mindfulness meditation, and to evaluate the functionality of *Mind-IT* to engage students in practicing mindfulness meditation. The driving question of this phase was: What features in an online environment can foster individuals' engagement with mindfulness meditation? Through benchmarking and usability evaluation, I gathered data about interactive design functionalities to promoted engagement with mindfulness. Data were examined using navigation analysis.

Findings of this phase illustrated commonly used design features among selected mindfulness apps that informed Mind-IT, particularly adding reminders for continued practice and motivational feedback after completing a task. In addition, findings from the usability tests showed the need to declutter the material and have an easy-to-see calendar of activities. Findings were used to iterate *Mind-IT* by improving the navigation and the user experience for students, especially to promote their engagement with *Mind-IT* and mindfulness meditation.

CHAPTER VI

DESIGN OF MIND-IT

In this chapter, I describe the final design of *Mind-IT* that was piloted with a sample of 12 students from the incoming cohort of the School of Veterinary Medicine. *Mind-IT* was offered to students through the online learning platform officially adopted by the institution (Canvas), such that it would be familiar and integrated into their learning environment. The course was created based on an integrated framework of transformative learning and interest development, then revised in two phases. The iterations of *Mind-IT* were informed first by a needs assessment that helped define the learning context, and second by a review of online technologies for engaging with mindfulness meditation and a usability evaluation of a prototype.

The length of the course was intentionally short (15 days), such that time would not prevent students' initial engagement. The introductory modules took two weeks and were meant to foster situational interest in mindfulness meditation as well as provide opportunities for transformative learning, which could potentially reduce students' barriers to keep engaging with mindfulness. After the two-week course, *Mind-IT* continued to be available for students to access mindfulness practices, but no assignments or interactions were required.

The objectives of the course were (1) to promote a clear and non-religious understanding of mindfulness in order to normalize the practice among students, (2) to broaden learners' views of the benefits and the relevance of mindfulness in their lives, (3) to trigger a situational interest in engaging in mindfulness practices, and (4) to maintain that interest through diverse opportunities to learn and embody mindfulness meditation.

Generally, in the first week, the learning experiences were designed to help students self-reflect and connect personally with the content, assess their assumptions about mindfulness meditation, and possibly reexamine their perspectives. In the second week, the activities provided a chance to engage in group discussion, validate alternative views of mindfulness meditation, and engage with a short mindfulness practice to embody the conceptual knowledge for a more holistic learning process (Kerka, 2002; Stolz, 2015). Next, I present the activities incorporated into *Mind-IT*.

Course Activities

I started students in *Mind-IT* with an overview of the purpose and dynamics of the course to familiarize them with the timeline of activities. On the homepage of the course, students found a short introduction to the instructor and to how the course was planned, with a calendar that laid out the sequence of activities and suggested when to complete each task in the course. On the second page, still within the overview, students had access to guidelines and expectations for engagement and learning, in addition to the calendar (Figure 40).

As part of the default in Canvas courses, the vertical menu on the left-hand side of the page cannot be manipulated to contain links to any page within the course. Of the links in the default menu, I hid those that were not pertinent to *Mind-IT* (e.g., People, Grades, Conferences) and left visible for students only the minimum that were meaningful to the course (i.e., Home, Announcements, Discussion, Modules). In addition to the default vertical menu, I created a horizontal shortcut menu, mainly to allow easy access to the *Instructor* page and to the *Mindfulness Practices* page. However, I also

included links to the course *Homepage* and to the *Modules* page since they were hub

pages that might help students navigate *Mind-IT*.

Figure 40

Screenshot of the overview page in Mind-IT containing the calendar of activities

Figure 41

Flowchart depicting the roadmap of learning activities in Mind-IT during the two weeks
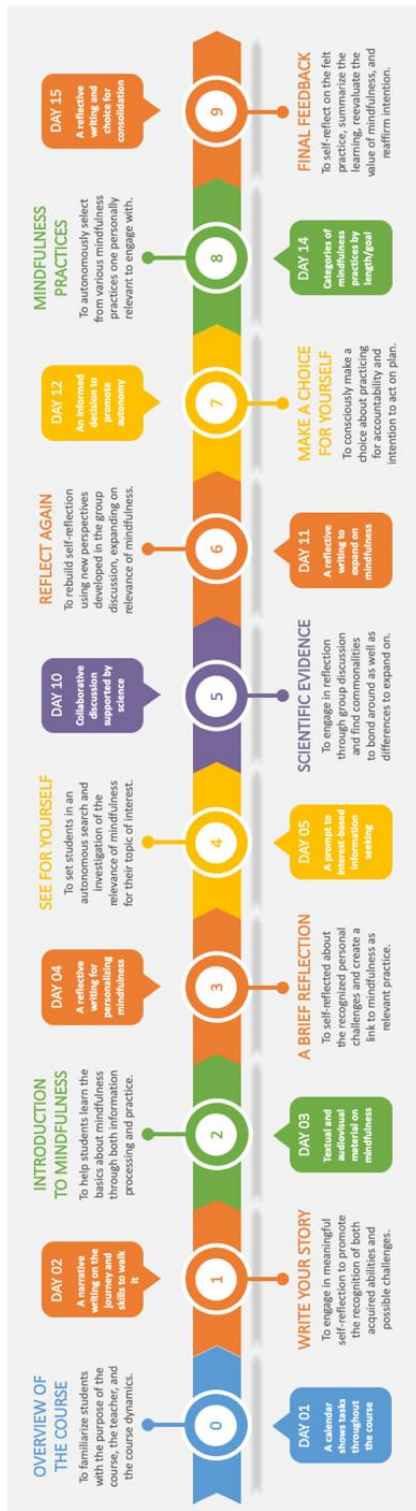
The calendar timeline also served as a menu, providing links to each activity page of the course. Because *Mind-IT* was designed to take students sequentially through the course, students had to navigate linearly and complete the first task before gaining access to the second, and so on. To facilitate this, I also offered linear navigation with the *Next* and *Previous* bottom buttons. The roadmap of the learning activities throughout the two weeks of *Mind-IT* is depicted in the following flowchart (Figure 41).

Activity #1

After the overview, on the second day of the course, the first writing activity asked students to write a short essay about the challenges they had in getting into the Veterinary Medicine program. The prompt for reflection included what they imagined to be the challenges and skills needed to successfully finish their degree (Figure 42). This task was individual and private, so that students felt safe to write their personal stories. This writing assignment was the starting point to establish personal connection with the content and to initiate reflection on a possibly disorienting dilemma.

To promote rapport and empower students, I shared my personal story related to challenges in academic life, showing and inviting vulnerability. This content was available on the *Instructor* page, together with my contact information so that students could get in touch with me regarding any questions or needs they might have.

Activity #2

Following the individual narrative writing, on day three of the course, students were introduced to mindfulness through reading text, watching videos, and practicing a brief exercise (Figure 43) to learn not only conceptually, but also experientially. As

suggested in Chapter II, the theoretical framework, embodying mindfulness through engaging in practice, might foster both interest development and transformative learning.

Figure 42

Screenshot of the Write Your Story assignment in Mind-IT

The way mindfulness meditation was presented to students in *Mind-IT* was based heavily on the first cycle of DBR, which defined contextual conditions for learning. The language used to introduce the definition of mindfulness was simple and relatable, but based on science and research evidence. The topics presented about mindfulness aimed to address some of the main barriers to practice found in the survey data (e.g., preference to be accomplishing something instead of meditating, lack of time and knowledge) and to frame mindfulness meditation in relation to its benefits to things that were meaningful and valuable to students (e.g., convenience, performance, well-being).

Figure 43

Screenshot of the Intro to Mindfulness page in Mind-IT

Activity #3

Continuing with the objective of broadening learners' perspective and developing situational interest, I suggested that students write about mindfulness as a skill that might or might not be of personal value in pursuing an academic degree (Figure 44). The prompt was aimed at critical reflection based on what they knew up to that moment in the course, as well as at critical self-reflection, considering the expected challenges they mentioned in the previous writing exercise and linking back to their personal stories.

Figure 44

Screenshot of the A Brief Reflection assignment in Mind-IT

Activity #4

After students reflected on the possible personal value of mindfulness based on their current level of knowledge, at the end of the first week of the course I prompted students to seek evidence-based information about mindfulness that they would find valid

and meaningful. That is, to further validate the perspective that mindfulness meditation could be of personal value, I suggested that students search Google Scholar for a scientific paper reporting results on the effects of mindfulness meditation in relation to a topic of personal interest, particularly associated with a challenge or skill they mentioned in the first writing activity (Figure 45).

Figure 45

Screenshot of the See for Yourself assignment in Mind-IT

Finding evidence for the possible benefit of mindfulness to the challenges they imagined in their narratives might support the personal connection that maintains situational interest, as well as strengthen the legitimacy of a new, broader, and more inclusive perspective of mindfulness meditation. By encouraging students to actively search for information, this task aimed to promote students' autonomy in finding and choosing one article to read based on a topic that was important to them, reinforcing interest development and intention to engage in mindfulness meditation.

Activity #5

After reading the chosen paper, halfway into the second week of the course, students then shared a summary of the research and its findings on a discussion board. This was the first and only time that students interacted with each other in *Mind-IT*. Although creating a community around mindfulness might be an important part of normalizing and encouraging the practice (Barbezat & Bush, 2013b; Kurash & Schaul, 2006), for this introductory course aimed at reducing barriers to engaging, it was more important to first create a space where students could feel comfortable and safe together.

I asked students to interact with each other by replying to their peers' original posts and comments (Figure 46). Because the posts were about evidence from research on mindfulness meditation in relation to students' chosen topic of skills and challenges in academic life, the discussion might convey personal and meaningful conversations, facilitating students' connection with the content and each other. As the instructor of the online course, I participated in the discussion by moderating interactions and sharing additional information about mindfulness meditation to cover aspects not identified by students' searches that could still be relevant to them.

Surprising information on mindfulness, coupled with a clarifying group

discussion, aimed to reinforce the validity of their new viewpoint and their connection

with mindfulness, allowing transformative learning and maintaining situational interest.

Also, in identifying similar topics (i.e., shared expected challenges), students might feel a

sense of community that could support engagement with mindfulness (Hidi et al., 2004a).

Figure 46

Screenshot of the Scientific Evidence assignment in Mind-IT

Activity #6

After students discussed scientific evidence and connected with each other's

topics, I prompted them to reflect again and write about their view of mindfulness as a

valuable (or not) skill to support them through academic life (Figure 47). The prompt was

somewhat similar to that in the first reflection, only now they had gained new information and shared perspectives. The activity asked learners to reevaluate prior assumptions about the personal value of mindfulness meditation as they made meaning of their academic experiences and incorporated new knowledge about the benefits of mindfulness meditation. By doing this, students might cultivate the intention to engage in mindfulness meditation practices.

Figure 47

Screenshot of the Reflect Again assignment in Mind-IT

Activities #7 and #8

Building on this possibly more open standpoint, after the evidence-based discussions and the critical self-reflections, I invited students to voluntarily engage in a mindfulness practice. These activities relied on learners' autonomous behaviors and comprised a set of actions. Activity #7 asked students to actively and consciously choose

whether they wanted to engage with mindfulness meditation or not, by clicking on their answer to the question. Next, students had to pick a meditation practice they intended to try among the available practices in *Mind-IT*. Finally, in activity #8, they had to act on their intention and engage with the chosen practice (Figure 48).

Figure 48

Screenshot of the Make a Choice for Yourself assignment in Mind-IT

Hidi and Renninger (2006) have suggested through their model of interest development that interest may start situationally, elicited by personal identification and surprising information. However, to sustain a triggered situational interest and develop it

further, individuals should get actively involved in related activities. What is more, meaningful participation comes from choice and autonomy (Hidi & Harackiewicz, 2000; Hidi & Renninger, 2006). In prompting students to choose for themselves and offering a variety of options for practice, I aimed to facilitate learners' engagement based on a triggered situational interest. Among the mindfulness practice choices in *Mind-IT*, I included meditation exercises that involved students' already well-developed individual interests (e.g., hiking in nature, walking dogs, riding horses) in order to stimulate their situational interest in mindfulness (Figure 49). A variety of short practices were also included to allow for engagement in case students perceived time as a barrier (Figure 50).

The idea was to facilitate the embodiment of the new conceptual knowledge that came from reading, discussing, and reflecting about mindfulness. Extending the gained knowledge from the mental level of understanding to the experiential level of feeling in the body might strengthen individuals' personal connection and situational interest.

Figure 49

Screenshot of meditation audio exercises tailored to students' well-developed interests
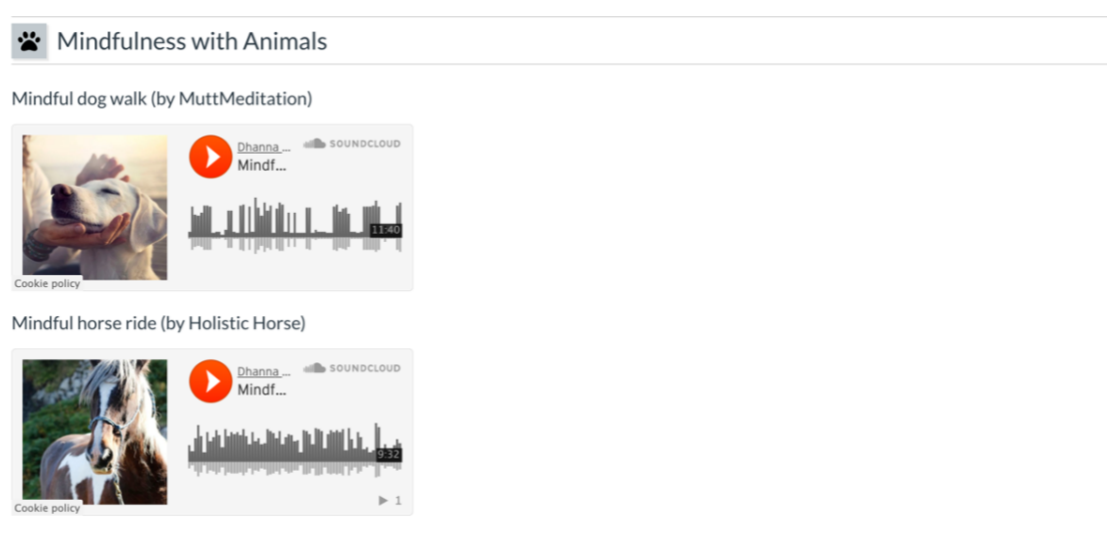
Figure 50

Screenshot of the top of the Mindfulness Practices page in Mind-IT

Activity #9

After students chose and engaged with a mindfulness meditation practice, the

final activity in *Mind-IT* was to reflect once more. However, because practicing one of

the exercises in the list was a choice and students could choose to not engage, this

activity started by asking students to indicate whether they had practiced or not (Figure

51). Then, based on their response, they had different reflection prompts in *Mind-IT*.

Figure 51

Screenshot of the Final Feedback activity in Mind-IT

For those students who actually engaged in a mindfulness meditation practice of choice, the third and final critical self-reflection was to revisit their learning experiences of mindfulness meditation in *Mind-IT* and evaluate once again whether they thought mindfulness could be valuable to them (Figure 52). In addition, they had the option to indicate whether they would like to receive weekly notifications to keep practicing mindfulness throughout the semester. In the reminder, I planned to offer some additional information in the form of short hints and curious facts about mindfulness. This way, the cycle of learning and engaging with mindfulness could continue, maintaining situational interest through meaningful new information and engagement opportunities and allowing transformation through progressing with mindfulness practices.

For students who opted out of trying a short mindfulness meditation practice or did not make the time to engage in the chosen meditation exercise, I prompted a third and

final critical reflection about their learning experiences with *Mind-IT* and why they chose

not to engage (Figure 53).

Figure 52

Screenshot of the Final Feedback activity in Mind-IT if a student clicked the Yes button

Figure 53

Screenshot of the Final Feedback activity in Mind-IT if a student clicked the No button

In the next chapter, I present findings from the third phase of the DBR, where I

piloted *Mind-IT* with incoming Veterinary Medicine students.

Summary

Mind-IT was offered to students through an online learning platform and created based on an integrated framework of transformative learning and interest development, then revised in two phases of DBR. The iterations of *Mind-IT* were informed first by a needs assessment that helped define the learning context, and second by a review of online technologies for engaging with mindfulness meditation and a usability evaluation of a prototype. The course was planned to have 10 activities throughout 15 days in the beginning of participants first semester. After the two-week course, *Mind-IT* continued to be available for students to access mindfulness practices, but no assignments or interactions were required.

The objectives of the course were four-fold: (1) to promote a clear and non-religious understanding of mindfulness in order to normalize the practice among students, (2) to broaden learners' views of the benefits and the relevance of mindfulness in their lives, (3) to trigger a situational interest in engaging in mindfulness practices, and (4) to maintain that interest through diverse opportunities to learn and embody mindfulness meditation. The learning experiences were designed to help students self-reflect and connect personally with the content, examine their assumptions about mindfulness meditation, engage in group discussion, validate alternative views about mindfulness meditation, and engage with short mindfulness practices to embody the conceptual knowledge for a more holistic learning process.

CHAPTER VII

THIRD CYCLE OF DESIGN-BASED RESEARCH

In this chapter, I present the third and last cycle of Design-Based Research planned for this study. I describe the process of recruiting participants, the procedures for collecting data, the sources of data used and analysis conducted, and how findings informed iterations of *Mind-IT*. The purpose of the third cycle of this DBR was to pilot *Mind-IT* and identify whether and how participants' experiences of learning facilitated their engagement with mindfulness meditation. Engagement is defined as directed attention to performing a learning task and indicates a level of situational interest (Renninger & Hidi, 2011) and openness to mindfulness (Hoggan, 2016). The question driving this DBR cycle—To what extent do learning experiences with *Mind-IT* help participants change their perceptions of mindfulness meditation as well as develop situational interest in the practice?—was examined in two parts:

c) To what extent do the learning experiences with *Mind-IT* help participants explore and change perceptions about mindfulness meditation?

d) To what extent do the learning experiences with *Mind-IT* help participants develop situational interest in mindfulness meditation?

Next, I present the methods and findings from this phase of the study, laying out the processes of recruitment, data collection, and data analysis I conducted in piloting *Mind-IT* with a sample of graduate students in the Veterinary Medicine program.

Methods

In this part of the study, I offered *Mind-IT* as an optional course to a cohort of students starting in the Veterinary Medicine program in fall 2018. I collected data throughout participants' learning experiences with *Mind-IT*, during the two weeks of the course, and right after they finished it. In this section, I describe the participants in this study, explain how participants were recruited, outline the different sources of data collected to inform the last design iteration planned in this study, and discuss the types of analysis employed to better address the research question.

Participants

The third phase of the DBR happened at the beginning of fall semester 2018. For this last phase, which aimed to investigate whether the design broadened participants' perspective and developed their interest in practicing mindfulness meditation, participants were recruited exclusively from the incoming cohort of Veterinary Medicine. On August 22nd, at the end of an orientation class, I personally presented a brief overview of the course and research to participants (see slides in Appendix F) and invited them to enroll and participate in the study. For this phase, the study aimed to recruit at least 10 participants. Of the 30 students in the classroom, 13 signed up to participate in the two-week online course.

Of the 13 participants recruited to participate in this phase of the study, one dropped out and did not complete the procedures. Thus, the sample for this study was composed of 12 participants who all declared they were full-time students, although two of them also worked part-time. Of the 12 participants, ten were female and two were

male. The average age was 23, ranging from 20 to 29. This sample is somewhat representative of the population, according to the available class statistics, which indicated an average age of 24.3, ranging from 20 to 36, and a gender split of 76% female and 24% male. All participants in the sample declared they were White. Eight of the participants were single, three were married, and one declared marital status as cohabiting. Only one participant had children. Five participants were not religious, while three said they were religious but participated only casually, and four declared that they formally engaged in religious practices. Three participants indicated they had never heard of mindfulness before *Mind-IT*, and among the nine participants who had heard of it, the level of knowledge was medium to low. In terms of practicing mindfulness, only two participants declared they had practiced some mindfulness meditation before. Based on the current first-year class, age among these students ranged from 21 to 38 years old. The gender breakdown tended to be almost equal, with slightly more female (53%) than male (47%) enrollments.

To gauge participants' initial interest in learning mindfulness meditation, I asked how likely they would be to practice mindfulness if it was an optional activity in a course. One participant reported it to be unlikely, one was neutral about it, and ten said they would likely practice mindfulness if offered, indicating that most participants (80%) had some initial interest in engaging with this kind of meditation exercise. When asked about factors that might prevent their full participation in the *Mind-IT* online course (Figure 54), 92% of participants (11 out of 12) indicated that having an overload of academic demands would be the number one hindrance. The second most selected hindrance to their participation was the perception of not having enough time in general

(83%). Only one participant indicated a conflict with religion as a reason to disengage, and none of the participants felt that the content being unimportant was a hindrance to full participation, which might indicate an initial perception of mindfulness as relevant.

Figure 54

Rank of factors that might contribute to disengagement with a two-week mindfulness course
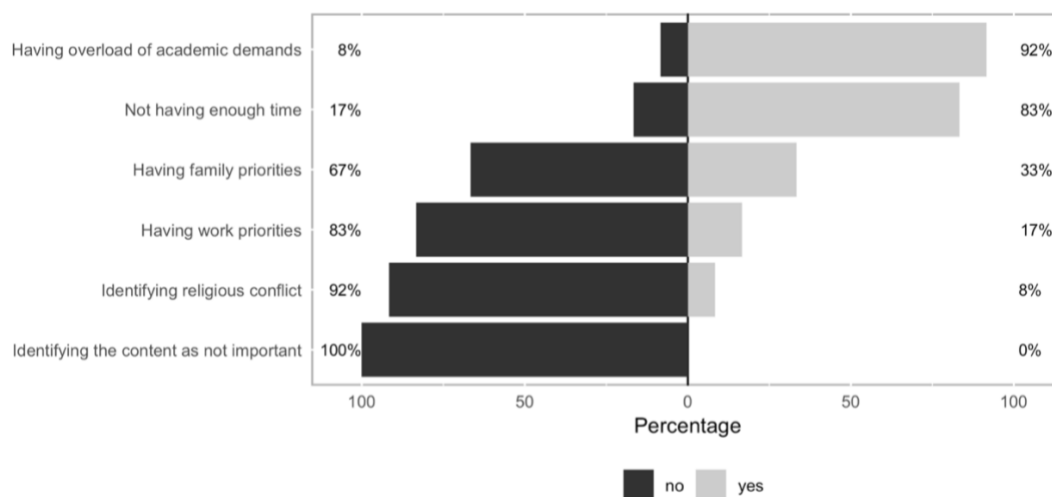
Finally, for the last part of the survey, participants indicated their level of agreement with different statements about why it would be difficult for them to meditate in general. The lack of understanding about what mindfulness meditation entailed seemed to explain the main difficulties pointed out by participants (Figure 55). Eighty-three percent of participants (10 out of 12) reported that a preference to be accomplishing something—indicating they did not associate mindful exercises with productivity—and an inability to stop thoughts were the top two reasons that engaging with meditation was difficult. In addition, 75% of participants stated that not knowing whether they were doing it right and not knowing much about meditation were reasons meditating was difficult for them.

Figure 55

Rank of reasons why participants agreed it might be difficult to meditate
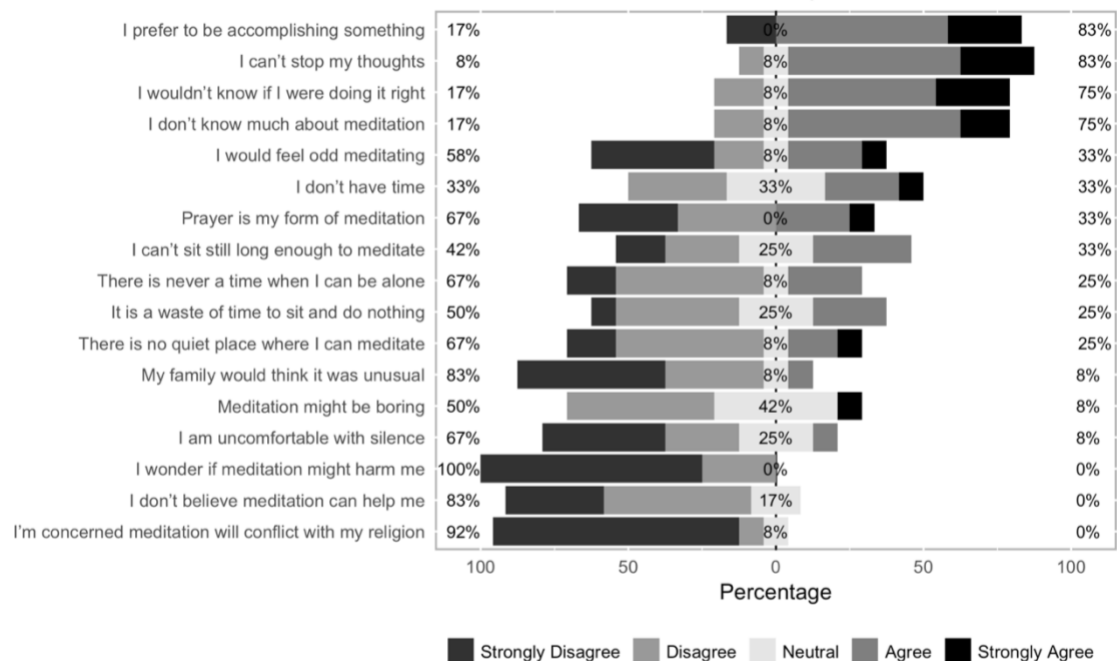
Note. Percentages on the right-hand side represent responses of agreement (i.e., agree and strongly agree); those on the left-hand side are the responses of disagreement (i.e., disagree and strongly disagree); and those in the middle are the neutral responses

Table 5 below provides an individual overview of each participant in the study.

Table 5

Overview of each individual participant in this cycle of DBR

Participant (gender)	Age	Religious practice	Marital status	Mindfulness knowledge	Mindfulness practice	Likelihood of practice	Focus group
Amy[F]	22	Informal	Single	Low	None	Likely	A
Brenda[F]	23	None	Single	High	Some	Likely	A
Carol[F]	24	Informal	Single	Some	None	Likely	A
Denise[F]	22	None	Cohabit	Low	None	Likely	A
Evelyn[F]	24	Informal	Married	None	None	Likely	B
Florence[F]	21	Formal	Single	Some	None	Likely	B
Gloria[F]	22	Formal	Married	Some	None	Likely	B

Heather[(F)]	25	None	Single	Some	None	Unlikely	B
Iris[(F)]	22	None	Single	None	None	Likely	B
Julie[(F)]	20	None	Single	None	None	Neutral	C
Keith[(M)]	22	Formal	Single	Low	None	Likely	C
Lucas[(M)]	29	Formal	Married	Some	Some	Likely	C

Note. Focus groups A, B, and C were interviewed one day, two days, and three days after the end of *Mind-IT*, respectively.

Procedures

Participation was voluntary and all participants who completed at least 85% of the required learning tasks in the *Mind-IT* course, in addition to completing the online surveys, received a $60 gift card for their time and effort. Participants started by answering a pre-course survey, which asked demographic questions and assessed their prior knowledge of, interest in, and perceived barriers to mindfulness meditation. (see Appendix C and G). During the two-week course, which started with the first week of classes on August 27th and ended by September 10th, participants engaged in a variety of learning activities, including written reflections, evidence-based discussion, and mindfulness exercises. Participants answered a two-question survey after each activity in the course aimed to assess their interest in each task (see Appendix H). By the end of the course, participants were prompted to answer a post-course exit survey that aimed to assess their situational interest in the mindfulness meditation course (see Appendix I). Participants were also invited to participate in a focus group interview to talk about their experiences with the course and give feedback for further improvement. Recruitment for the focus group interviews was through Canvas at the end of the last learning activity (see Appendix J), where participants signed up for a spot on one of the available interview

dates. I conducted three focus group interviews, each with a different set of participants. I interviewed the first focus group one day after the end of the course; this group was composed of four participants who self-selected that date (Amy, Brenda, Carol, and Denise). The second focus group interview occurred one day later; this group was composed of five participants (Evelyn, Florence, Gloria, Heather, and Iris). The third and last focus group interview was two days later and involved three participants (Julia, Keith, and Lucas). All 12 participants attended a focus group. Participation was voluntary and participants received a $20 gift card for their time and effort.

Data Sources

The data sources used in this phase of the research are listed and explained in more detail in this section. The focus group interview constituted the main source of data in this study because it was the most comprehensive source of data in isolation. That is, the interview questions broadly covered all aspects of the research questions. The surveys and written reflections were used for triangulation, to confirm or confront data from the focus group interviews. Table 6 presents an overview of the timeline of data collection and analytical strategies.

Table 6

Overview of data collection and analysis methods used in this cycle of DBR

Timeline	Data source	Data collection instrument	Analytical strategy
08/20 – 08/26	Pre-course survey	20-item demographic survey 17-item DMPI instrument ($\alpha =$ 0.87)	Descriptive statistics
08/27 – 09/10	Written reflections	4 written reflections per participant collected as assignments in Mind-IT	Thematic analysis

08/27 – 09/10	5 post-activity surveys	1 closed-ended question about task likability collected right after each of 5 activities in Mind-IT	Descriptive statistics
09/10 – 09/11	Post-course survey	14-item SIS instrument ($\alpha = 0.95$)	Descriptive statistics
09/12 – 09/14	3 focus group interviews (total of 83 transcript pages)	11 open-ended questions about participants' learning experiences with Mind-IT	Thematic analysis

Note. The timeline column refers to the time data were collected.

Focus groups

At the end of the two-week course, I invited all participants to attend a focus group interview, which was held in a conference room at Utah State University. Three focus groups were interviewed, and a maximum of five participants were in each group. The goal of the focus group interview questions I designed was to identify whether and how participants' experiences with *Mind-IT* elicited a shift in their perspective about mindfulness and situational interest in practicing meditation.

The same set of open-ended questions was used in all three interviews. I designed these questions (see Appendix K) based on the theoretical framework I adopted in this study, which integrates the four-phase model of interest development and the transformative learning theory. In particular, the prompts were meant to uncover experiences that may have promoted a change in perspective about prior beliefs and assumptions about mindfulness and may have triggered situational interest in learning and practicing mindfulness meditation. Focus group sessions lasted approximately 60 minutes each and audio was recorded and transcribed for further analysis.

Surveys

Prior to starting the course, I surveyed participants to collect demographic data and examine their prior interest in and experience with mindfulness meditation (see Appendix G). The survey was composed of 20 questions, both closed- and open-ended, which generally aimed to identify participants' background context and interest in engaging in a mindfulness meditation course.

Additionally, I assessed participants' beliefs and barriers about meditation using the Determinants of Meditation Practice Inventory (DMPI; Williams et al., 2011), a psychometrically tested and validated survey instrument (see Appendix C) that uses Likert scale items to measure attitudes and beliefs of novice meditators about practicing meditation. The survey comprised 17 items in a 5-point Likert scale self-report (from 1 = strongly disagree to 5 = strongly agree), in which scores could range from 17 (i.e., lower perceived barriers) to 85 (i.e., higher perceived barriers). The instrument reliability was found to be high, with Cronbach's α of 0.87. Examples of survey items include "Meditation might be boring"; "Prayer is my form of meditation"; "I don't have time."

At the end of the course, I asked participants to self-report their situational interest using the Situational Interest Scale (SIS) instrument adapted from Linnenbrink-Garcia et al. (2010). The instrument comprised 14 Likert scale items that asked participants to self-report their level of agreement (1 = strongly disagree, 7 = strongly agree) with statements such as "The lectures in this class aren't very interesting"; "To be honest, I just don't find the topic interesting"; "I find the content of this course personally meaningful" (see Appendix I). Construct validity of the instrument was done through confirmatory factor analysis and indicated the best fit was a three-factor model composed of both triggered

and maintained situational interest in which maintained interest had two dimensions,

feeling and value. Reliability computed for the items was high ($\alpha = 0.95$).

Additionally, after finishing each activity in the course, participants were

prompted with a question to assess whether they liked that learning experience. Finally,

the one participant who dropped out of this phase of the study received a link to a short

exit survey (see Appendix L) to ask why the student withdrew from the study. All survey

data were collected online through either Qualtrics or Canvas quizzes and then

downloaded to a secure Box folder for analysis.

Written reflections

Throughout the course, participants performed writing activities to reflect on their

perceptions of activities and learning. These assignments (described in Chapter VI)

prompted participants to use contemplation and self-reflection, as well as scientific

evidence and analytical reflection, to enter a discourse both with themselves and with

others enrolled in the course. These written reflections were part of the data used for

identifying participants' views and perceptions about mindfulness meditation and,

possibly, ways they might have shifted their perspective and developed interest over time.

These data were collected entirely online, through either an embedded word processor in

Canvas (e.g., discussion posts, comments) or files attached to the assignments, such as

Microsoft Word documents.

Data Analysis

In this last cycle, I conducted thematic analysis on the main source of data (i.e.,

focus group interviews) and triangulated findings by using descriptive statistics and

conducting thematic and content analysis on other collected data sources (i.e., surveys

and written reflections). An overview of the analysis process is shown in the flowchart

(Figure 56).

Figure 56

Flowchart of the processes involved in the data analysis
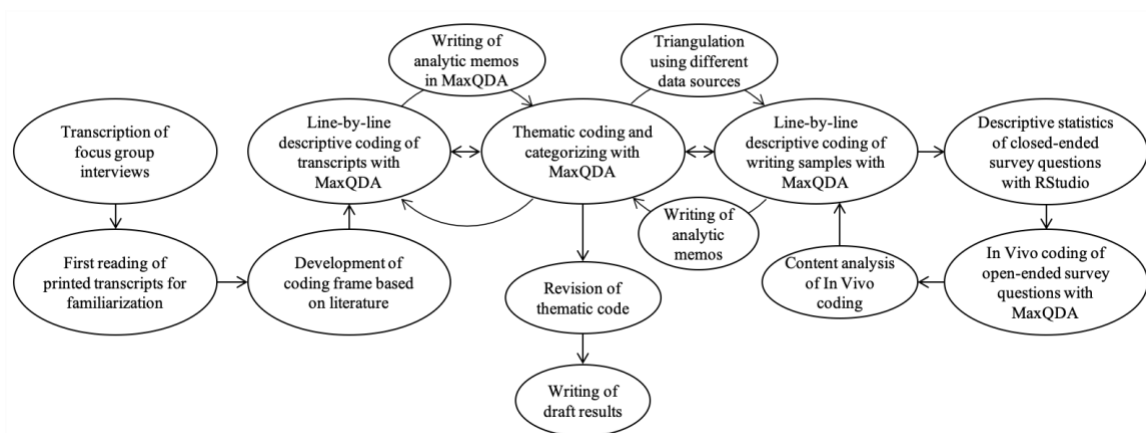
The data analysis involved a deductive thematic analysis grounded in the

theoretical framework of the study (Braun & Clarke, 2006). First, to familiarize myself

more with the data, I printed the focus group interview transcripts and read through them,

highlighting participants' learning experiences in a binary way, color-coding them as

either transformative learning or interest development. Then, I further identified in the

literature the outcomes and processes that research has associated with either framework;

these informed the descriptive codes of my initial coding frame (Figure 57).

Figure 57

Literature-based map of possible descriptive codes for both the transformative learning (top) and interest development (bottom) frameworks
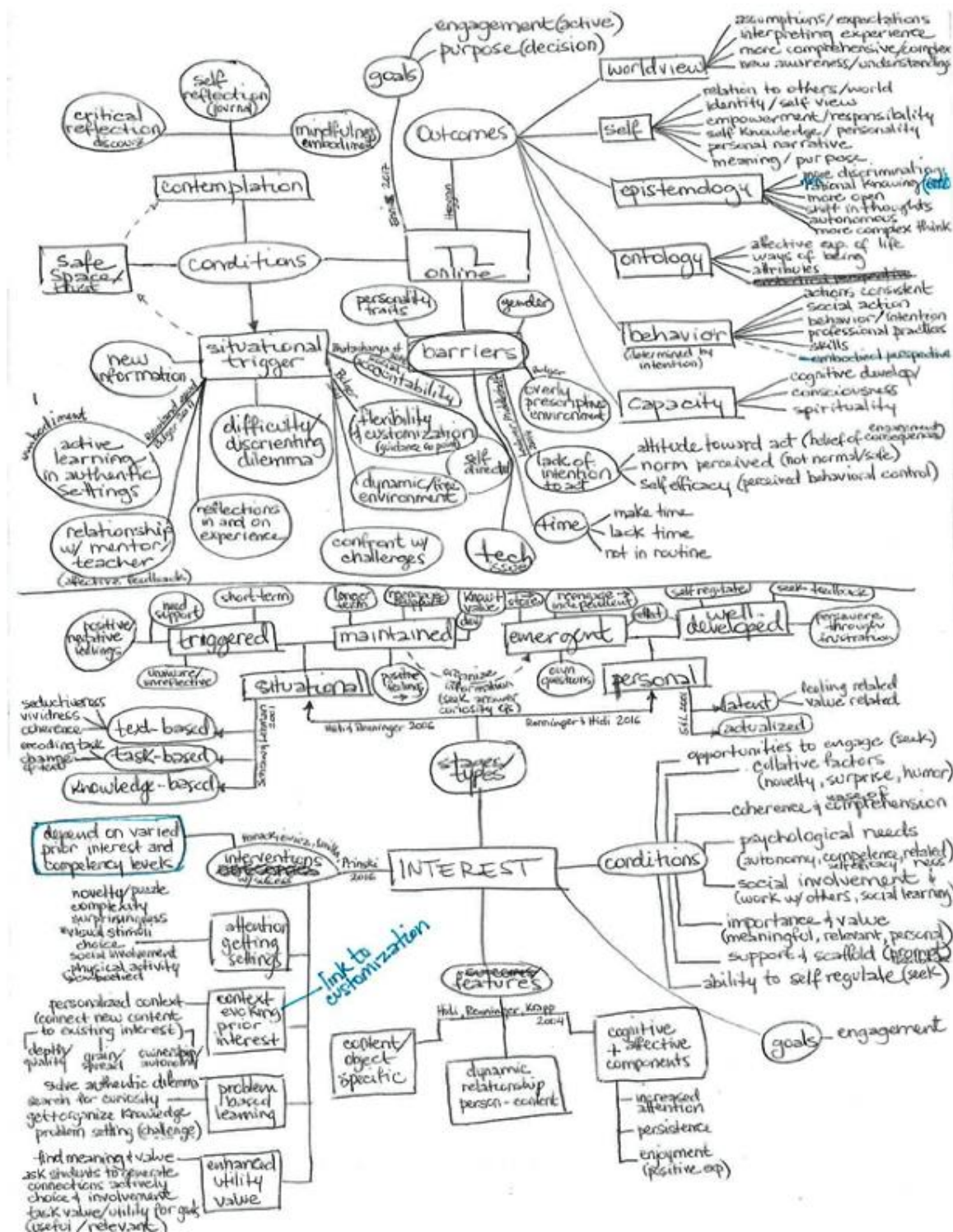
Transformative learning, according to the theory, may occur when participants are empowered to holistically contemplate (i.e., reflect rationally, somatically, emotionally, and/or relationally) old ways of thinking, being, and interacting so that barriers to change are reduced (i.e., there is openness), and their perspectives, experiences, and behavior shift (Cranton & Taylor, 2012; Hoggan, 2016; Sable, 2010; Taylor, 2008). Situational interest, according to the four-phase model, may develop when participants' learning interactions with specific content (e.g., mindfulness meditation) arouse their cognitive and affective resources (i.e., triggered situational interest) and help them forge meaningful connections (i.e., maintained situational interest) such that, having the opportunity, they are likely to reengage in learning over time (Harackiewicz et al., 2016; Hidi et al., 2004a; Linnenbrink-Garcia et al., 2010).

I chose descriptive coding as a way to summarize the content that participants talked about and assigned them theory-informed labels (Saldaña, 2013). As I transferred the highlighted excerpts from the physical paper into the MaxQDA software for Mac, I performed a first coding phase by interpreting and descriptively coding the highlighted segments of data based on the coding frame developed earlier.

Next, I returned to the research questions driving this cycle of DBR to ensure that the codes were not only theoretically meaningful but could address the questions of the study. In this second phase of coding, I started organizing the descriptive codes and collapsing them into categories that defined the major themes in the data. As I performed another round of descriptive coding, I revised the codes to anchor the analysis in the research questions, reducing the coding scheme to narrow it down to reflect the purpose

of this research. After revising, I performed a third round of coding and writing analytic memos to organize the codes into themes, based on patterns I found in the data that related back to the framework used in the study. These multiple rounds of coding and writing analytic memos allowed for greater truthfulness in the findings (Patton, 2001; Saldaña, 2013). The final list of descriptive codes from the focus group data contained 375 code excerpts, of which 233 were related to participants' interest development and 142 to transformative learning experiences.

In Table 7 below, I provide an example of descriptive coding from the last focus group interview I conducted, which included three participants—Julie, Keith, and Lucas. I welcomed participants and introduced the purpose of the focus group interview as a way to get their feedback on their learning experiences with *Mind-IT*. As exemplified in the segment of data below, the background knowledge of the theoretical framework was essential to the analysis because it allowed me to interpret participants' conversations around the protocol questions in a much richer way than the prompts were designed to identify. That is, although the prompts aimed to detect activities that participants found most interesting, their dialogue contained other details about their experiences that informed my interpretation of their transformative learning.

Table 7

Example of descriptive coding of an excerpt from one of the focus group interviews

Name	Transcript	Descriptive Code
Interviewer	Was there any task or learning experience during those two weeks that stood out for you? And why?	
Keith	I think the... this... the practicing it for yourself the first time, of course, because you don't quite know what to expect. And I don't know about y'all...	CODE: Novelty/surprise

Lucas	Did your wife make fun of you?	
Keith	I'm not married! So... no!	
Lucas	Nope. The first time she made fun of me and then she did it with me. And it's like, oh, this is actually kind of cool.	CODE: Social involvement CODE: Mindfulness as normal
Keith	Like, that's the thing! It's, like, if you see someone doing it, like, if you don't know, it's kind of, okay, he's, he's interesting. And then you do it and, like, no, this is actually a real thing. It's actually valuable. And that was, that's kind of my experience, like, just going through it all. Like, it felt kind of funny, even though I was in my own apartment by myself, it felt kind of funny. But no, this is actually… I don't care what anyone thinks, this is worth it. So, I enjoyed it and I got a lot out of it. But I don't know about you guys.	CODE: Mindfulness as normal CODE: Perceived validity CODE: Perception of value CODE: New interpretations CODE: Perception of learning
Julie	I kind of liked that we had to kind of write a little comprehensive story about ourselves. And like, maybe things we've struggled with and all of that kind of stuff. And then we got to apply it. And it, I kind of saw how it could actually, like, fit together and work together. Because, I mean, usually when you're like, what did you struggle with? You kind of ignore those things. And so, having to, like, write that down, and like, think about it first, and then go ahead and do it, actually made me apply it better. So.	CODE: Coherence/comprehension CODE: Feeling mindful/conscious
Keith	I agree completely. I agree completely.	

In the excerpt above, I assigned ten codes to four lines of transcript referring to

one of the prompts used in the focus group interview. As I went through participants'

conversations, I kept in mind both the research question's aim—to identify

transformative learning and interest development experiences—and what the literature

has shown as illustrations or outcomes of either of the theoretical frameworks supporting

this study. I coded Keith's first response to what learning experience stood out for him as

Novelty/surprise, because he talked about practicing mindfulness for the first time and not having any idea what to expect. For Lucas's experience of having his wife join him being an aspect that contributed to his engagement over time (i.e., maintained interest), I applied the code *Social involvement*. He talked about their reaction to mindfulness as being different from their assumption of it, to which I applied the code *Mindfulness as normal*. I applied this code because his comment demonstrated a shift in perception that normalized the practice when he evaluated it as "actually kind of cool." The conversation continued as Keith replied to Lucas and reinforced the perception of normality in the practice as "actually a real thing," as opposed to something to be skeptical about, which I coded as *Mindfulness as normal* and *Perceived validity* since it also showed what made him see it as normal (i.e., the felt experience of practicing mindfulness). He went on to say that practicing mindfulness is "actually valuable," which I coded as *Perception of value*. He then described his experience of practicing and how worthwhile it was for him even though he felt awkward in the process. To this comment I applied the code *New interpretations*, as he stated a shift in his personal approach to practicing mindfulness, regardless of opinions and judgments. I applied one last code to Keith's comment, *Perception of learning*, as he talked about his experience and declared he had enjoyed learning mindfulness meditation. As Julie entered the conversation, she explained how the learning sequence made sense to her, to which I applied the code *Coherence/ comprehension*. I applied a second code to her reflection, *Feeling mindful/conscious*, as she continued sharing about how her learning experience in *Mind-IT* helped her be mindful of her struggles rather than ignore them.

In the final round of coding the focus group interviews, I refined the codes and categorized them into themes and subthemes fitting the framework and addressing the research question. I created thematic codes by recognizing literature-informed patterns in the data and using my analytic memos. To illustrate my process of defining the main themes, I explain below how the descriptive code *Perceived validity* was applied to Amy's comment and became part of the thematic code *Mindfulness as normal*, which fell under the thematic category *Shift in ways of conceptualizing* (Table 8).

Table 8

Example of thematic coding and categorizing a descriptive code

Name	Transcript	Descriptive Code	Thematic Code	Thematic Category
Amy	At first, I kind of thought, like, Oh, this is like a hippie thing, right? [laughter] Now I'm like, oh no, wait, this is actually like, science-based.	Perceived validity	Mindfulness as normal	Shift in ways of conceptualizing

The analytic memos included preliminary analysis of the descriptive codes I attributed to participants' comments, and I wrote them using the literature frame as the background for my interpretations. A recent study on the outcomes of a transformative learning experience indicated that individuals undergo shifts that can be generally classified as in their way of being, thinking, or behaving in the world (Hoggan, 2016). Within each of these three main categories is a plethora of possibilities for the type of shift that may occur. In the example above, Amy underwent a shift in the way she interpreted mindfulness meditation to be more in line with the new information she perceived as valid. In her new interpretation, she saw mindfulness from a different

perspective, indicating a shift in thought and a more open view due to scientific evidence supporting it. I interpreted this descriptive code as belonging to a thematic code I named *Mindfulness as normal*, as I recognized a pattern in the data where coming into contact with new, surprising information that was perceived as valid helped participants shift their perspective to reinterpret mindfulness meditation as normal rather than foreign. Because the shift was a mental one, where participants adopted a new way of thinking about mindfulness meditation, I defined this thematic code as part of the *Shift in ways of conceptualizing* category. Under this category that comprised ways in which participants changed their rationale about mindfulness meditation, I developed the following thematic codes: *Mindfulness as normal* and *Mindfulness as broad*.

After defining the major themes within the main data source, I analyzed other data sources for triangulation. Participants' written reflections and surveys were included in the data triangulation analysis. I used RStudio Desktop version 1.1.456 to calculate descriptive statistics and create graphics to illustrate the closed-ended survey data.

For the written reflections, I conducted two rounds of descriptive coding (Saldaña, 2013) using the same coding scheme as in the initial thematic analysis. I first identified the patterns and then organized them into the existing categories. The purpose of this second thematic analysis was to explore whether the data from the written reflections mapped onto the thematic analysis developed with the focus group data. Even though the content of the written reflections did not necessarily offer insights into all the themes previously created, analyzing it was still helpful to support or question some of the interpretations of the focus group data. The final list of descriptive codes from the written reflections data contained 190 code excerpts, of which 80 were related to

participants' interest development and 110 to their transformative learning experiences.
Table 9 outlines the final thematic codes and categories and provides descriptions and
examples.

Table 9

Codebook for Transformative Learning and Interest Development

Category	Code (# of excepts)	Description	Example
Conditions for transformative learning	Comfort (14)	Perception of comfort derived from a safe online environment to practice mindfulness meditation or familiarity with content.	Heather: "Well, I know, like… So, for example, I went to my first yoga class, like, in college, and I was with all my friends, and everybody's laughing, because it's, like, these weird poses. But if you go by yourself, you're a lot more like… focused. I'm going to do this. So, like, when you do it by yourself, you're a lot more, like... First off, you have to, like, make yourself do it. If you're by yourself anyway, that's your own initiative, I guess. Right? So, you take it more seriously. Cause you're wanting to do it, if you're doing it by yourself."
	Discomfort (30)	Experiences of stressful events or challenging situations that served as motivation to change and learn mindfulness meditation.	Iris: "I need to develop better time management, self-awareness, and stress management. It is crucial to work on these skills now because they will be even more important when I am in harder classes and in stressful situations in the clinic."
Shift in ways of conceptualizing	Mindfulness as broad (23)	New, broader conceptions of mindfulness beyond limited preconceived notions.	Heather: "Maybe I'm stressed at school, but I've taken it out on my boyfriend, and I shouldn't. So, if I could practice it, so, like, it doesn't help with just school, it helps with managing your life and school. So, I think it opened it, it opened up to that."
	Mindfulness as	Demystified view of	Lucas: "This is gonna sound really

	normal (15)	mindfulness meditation with gained sense that it is normal and even "cool" to practice it.	bad. We all thought she was a little weird. I'm so sorry! [laughter] So, we never… we never talked to her about [meditation]. We, in fact, we... she never really brought it up. It was her thing. Yeah... And then, like, once we talked to her about it, like, once we asked her about it, then she… she brought up a whole bunch of stuff that was really interesting."
Change in ways of experiencing	Mindfulness as personal (47)	Experience of mindfulness meditation working for participants and being a tool for academic life, helping them focus, be calmer, and respond to situations differently.	Brenda: "It's nice to know you have those [tools]. It's like a little toolkit you have and you're, like, when you are feeling, you know, those feelings, like we're saying, we're like: I'm not okay, I don't know what's going on. I'm anxious. I'm so stressed. And to know that you have that as an outlet, that toolkit to bring in, and to possibly decrease that anxiety or that stress."
Change in ways of interacting	Intention to practice mindfulness (25)	Conscious intention and choice of behavior to either practice mindfulness or act more mindfully.	Lucas: "I didn't actually open anything up. But I started thinking, like, okay, I'm going to run through the breathing exercises that I learned […]. And so, I did that."
	Difficulties with time management (14)	Difficulty with finding the time to practice mindfulness and setting the habit of meditating.	Brenda: "This does take discipline, it takes you wanting to practice every day, you know? And it may be [helpful to include], like, little reminders daily to practice."
Triggered situational interest	Ease of learning (34)	Perception of ease due to coherent and comprehensible design, convenient to participants' time availability and demanding routine.	Amy: "It was a really good timeline starting out. Like, the first week of school where we've… we've just had our orientation and we're just getting into classes, so our schedule is not super heavy yet."
	Perceiving novelty and surprise (31)	Notes on learning new and unexpected information as well as experiencing surprise in the	Denise: "We all had, like, a different idea on how [mindfulness] could apply to us. And so, it brought up things I, like, I didn't think it was... [a colleague]

		practice and benefits of mindfulness meditation.	did the compassion fatigue and I was, like, oh, that is so true!!"
Maintained situational interest	Holistic opportunities for meaningful learning (112)	Enjoyment and appreciation of varied course activities and seeing value in the usefulness and relevance of learning mindfulness meditation with *Mind-IT*.	Julie: "It was really interesting, like, because mine I did, like, I think I did mindfulness and something like focus or distress or something like that. And then reading the ones about, like, depression and anxiety and stuff. I was, like, you know, those are things that I feel, like, are what I felt, like, when I did mindfulness. I was feeling anxious about school and then I did the breathing practice, and then I felt like I could actually focus on what I needed to do, in the task at hand."
	Finding support and community (29)	Perception of support to learn and practice mindfulness either due to having feedback or feeling community in the discussion board activity or by practicing mindfulness with others.	Evelyn: "If we had, like, a question or said something in there, you addressed it, and you're, like, well, you can do this, you know, so, I really liked that a lot." Lucas: "It was actually really cool in class seeing people do it. It was really good!"
Hindered situational interest	Experiences of frustration (22)	Frustrating experiences with technology, such as accessibility issues, and with spending either more time or more effort than expected in an activity in the course.	Gloria: "I was a little frustrated to be honest, because just by using Google Scholar, like, when I type in, like, the two words, a lot of articles have pulled up I really didn't care about. And it seemed more like scientific presentation of evidence then actually, like, telling me how it could be beneficial, I felt like. And so, it took me a little while of searching and playing with different words to pull up something that I actually liked. But once I found it, like, that was cool. I didn't really like having to find it."

Findings

Findings from this phase of DBR addressed an overarching research question that, for clarity, was segmented into two subquestions. In this section, I describe the major themes within each subquestion and how the data suggested that participants' learning experiences with *Mind-IT* helped them explore and change their perception of mindfulness meditation as well as develop situational interest in practicing it.

RQ1a: Accounts of Transformative Learning

The first subquestion of this phase of this study—To what extent do learning experiences with *Mind-IT* help participants explore and change perceptions about mindfulness meditation?—investigated whether and how participants experienced transformative learning. Based on the theory, I organized the findings into four major themes: (1) the conditions that allowed for transformative learning to emerge, and the outcomes of this learning in terms of changes in (2) ways of conceptualizing, (3) experiencing, and (4) interacting with mindfulness meditation.

Conditions for Transformative Learning

I found in the data that the conditions allowing transformative learning were related to both the environment and the person. That is, in terms of the environment, participants' sense of comfort with the online setting helped them feel safe and in a familiar space to encounter new ideas and question previous assumptions. In terms of the person, participants started *Mind-IT* with a sense of discomfort due to stress and challenging demands that seemed to have functioned as a trigger to their situational interest in mindfulness meditation. The desire to overcome their discomfort drove them

to want to learn mindfulness meditation and experience transformation. I explain next how these conditions were present for the participants in *Mind-IT*.

Sense of Comfort. The first theme regarding conditions that allowed for transformative learning experiences was the perception of comfort in engaging with Mind-IT. Comfort derived from either a sense of being safe due to the online self-directed environment or a sense of being familiar with some element of Mind-IT, whether it was the topic or the approach to learning. When I asked participants in the focus group how it was for them to learn mindfulness meditation in an online environment, eight indicated feeling comfortable with practicing mindfulness on their own rather than in a social setting at first. In one focus group, Julie stated that "not everyone wants to practice something like this in a giant group, cuz that's kind of awkward. You're already conscious of everyone around you and you can't actually fully relax." In support, Lucas said that when a practice of mindfulness was offered in their in-person welcoming week he noticed his and others' discomfort. In his words: "A lot of the guys were like: Mmph. What is this? We're gonna go meditate? And so, like, I was actually walking to that room, like, this is gonna be so weird and awkward." Keith stated that providing a comfort zone was a benefit to the online environment. In another focus group, Gloria declared that because Mind-IT was able to introduce mindfulness meditation in an online private setting it made her feel more comfortable engaging with it. The conversation following Gloria's statement confirmed that feeling safe to engage was not only her experience.

Heather: I think you take it more serious when you're by yourself.

Evelyn: Absolutely.

Interviewer: How so?

Heather: Well, I know, like… So, for example, I went to my first yoga class, like, in college, and I was with all my friends, and everybody's laughing, because it's, like, these weird poses. But if you go by yourself, you're a lot more like…

Evelyn: Focused and…

Heather: Focused. I'm going to do this [practice]. So, like, when you do it by yourself, you're a lot more, like... First off, you have to, like, make yourself do it. If you're by yourself anyway, that's your own initiative, I guess. Right? So, you take it more seriously. Cause you're wanting to do it, if you're doing it by yourself.

Gloria: You're not worried about looking goofy?

Florence: Yeah, you're kinda not worried about people.

Evelyn: Yeah. Your eyes are closed. You don't have to worry about, like, peeking open, see if everyone else's doing it.

Gloria: Is anyone else looking?

The sense of comfort that the online environment initially offered participants to safely practice mindfulness meditation without feeling judged by others contributed to their willingness to engage enough to start feeling comfortable doing it in a group. Lucas talked about a time when they started practicing mindfulness together and, according to his description, "there were these girls in the back of the classroom who haven't been part of our classes [and did not know about *Mind-IT*] and just started laughing." Keith remembered the episode and added that, on the other hand, their peer Pedro, who was not participating in *Mind-IT* either, joined them in the meditation, closing his eyes when he saw that others had theirs closed.

In addition to feeling safe, comfort was also felt through familiarity with aspects of *Mind-IT*. Denise, for example, talked about it being natural for them in their generation to learn through YouTube videos and being able to relate with this approach in *Mind-IT*. In her words: "We're used to, like, watching YouTube videos and doing stuff, you know.

So that was like a familiar experience for me and I liked how noncommittal that introduction was, that I could just be like, oh, it's just this YouTube guy. I'm laying here. No one's judging me." A couple of participants felt familiarity with *Mind-IT* because of the topic. Carol, for instance, said that coming from their in-person week, where a lot was mentioned about general self-awareness, she could easily relate to *Mind-IT* and mindfulness as a continuation. Amy, on the other hand, mentioned that because of her therapy she was used to an environment where mindfulness exercises were suggested.

The subtheme of perceiving comfort did not show up as a topic in the written reflections data. Because none of the prompts for reflection in *Mind-IT* addressed this aspect of participants' learning experience, I was not able to map this condition for transformative learning in the data I used for triangulation. The reflections were focused on asking participants about challenges and how learning mindfulness meditation would or would not help them.

Sense of Discomfort. The other subtheme regarding conditions that allowed for transformative learning experiences was related to stressful events or challenging situations that participants had either undergone or anticipated going through that served as motivation for learning mindfulness. Five participants in the focus group interviews talked about expecting lots of stressful demands and challenges in pursuing their degree as the reason for enrolling in *Mind-IT*. Denise said that activities in the orientation week emphasized the many challenges of getting the degree; thus she started *Mind-IT* knowing about them. Keith also talked about knowing that it would be tough to go through and succeed in graduate school. Carol talked about the demands of Veterinary Medicine and how being aware of the many challenges brought her to choose to focus on what might

help rather than on the difficulties. Julie, in another focus group, shared a similar story of choosing to not focus on the difficulties, because looking forward made her feel anxious. Expecting Veterinary Medicine studies to be challenging and stressful seemed to have worked as a trigger for participants' situational interest in mindfulness meditation. That is, these participants were open and motivated to try out mindfulness from the beginning. Openness is a crucial characteristic that allows for transformative learning because it shows a non-fixed frame of reference that is empathic toward alternative views (Mezirow, 2012). Julie talked about how their orientation week brought up different challenges of being in the Veterinary Medicine program, but she did not feel that a clear way was offered to go about negotiating the challenges. In her words: "They never gave us an actual, like, way to do it. And made it sound very, very negative." Lucas said that in the orientation week they were advised to learn how to reduce stress levels, so when I presented *Mind-IT* and mentioned that mindfulness helped with stress, he wanted to try it.

Beyond the prospect of hard challenges in graduate school, three participants felt initially motivated to practice mindfulness because they were feeling stress or discomfort already, whether due to school demands or a combination of other anxiety-provoking situations. Carol, for instance, thought mindfulness meditation would help and engaged with it when not feeling well, as she said, "I think moving to Utah has finally hit. And then, like, exams are coming up." Both Lucas and Julie mentioned stressful situations at school that made them doubt themselves, but they chose to be mindful and stay positive. Being mindful means being present to current experience with openness, that is, keeping an open perspective without getting entangled in a wandering mind. Julie said that in a stressful time at the lab she took a breath and internally told herself that she could do it.

Lucas, though stressed and feeling the hardship of graduate school, said, "I keep telling myself, like, yeah, I can definitely do this." He also talked about other moments, both in school and at home, when he felt anxiety and decided to practice mindfulness to see whether it could help. Among uncomfortable events, insomnia or difficulty sleeping well was also mentioned by three participants in the study as their drive to try mindfulness.

In the written reflections data, I found a lot of support for this subtheme. In fact, because the reflection prompts were focused on asking participants about their challenges and whether they thought mindfulness might or might not help, most participants wrote about how their challenges were what led them to change their view of what they needed and triggered them to learn mindfulness. It seemed that having felt the difficulty of going through struggles and challenges fed their initial situational interest in mindfulness. The following statements are some examples of this prior interest in mindfulness being possibly related to participants' struggles and challenges. Amy said: "I will need to make continued efforts to promote my personal well-being in order to avoid burnout." Carol wrote: "I always get nervous before performing new tasks, so I have to learn how to stay calm as well as levelheaded." Lucas had a similar statement: "I need to keep a steady head and learn to keep calm in all the chaos." Florence's reflection indicated that she was interested in learning whatever would help her get through the hardship of the Veterinary Medicine program without falling behind. Iris said: "I need to develop better time management, self-awareness, and stress management. It is crucial to work on these skills now because they will be even more important when I am in harder classes and in stressful situations in the clinic." Similarly, Julie wrote: "The skills that will be most important for me to develop will be those of time management and finding a balance."

The conditions described in this session allowed participants' transformative learning experiences; that is, they facilitated participants' perspective exploration. As outcomes of these processes, data showed that participants changed the ways they conceptualized and experienced mindfulness meditation. Data also suggested that although participants had not dramatically shifted the ways they interacted—that is, some had not changed their actions to be able to create the habit of practicing mindfulness— they demonstrated that they had set an intention to practice. In the following sections I describe these shifts.

Change in Ways of Conceptualizing

Among participants of the study, changing how they thought about or understood what mindfulness meditation is was a central theme in the data. As participants learned new, surprising information about mindfulness and had initial opportunities to practice it, they manifested changes in thoughts that either broadened their understanding or brought a new perspective of normality to mindfulness meditation.

Mindfulness as Broad. Seven participants in the focus group talked about mindfulness meditation being more than they expected it to be, moving from a narrow focus on mindfulness meditation for stress reduction to a more comprehensive understanding of mindfulness. For example, Lucas said in his focus group interview that he began the course without knowing much about mindfulness beyond that it could help with stress. In his words, he "didn't even know what that meant!" By the end of the course, he wanted to practice more and recognized many more areas where mindfulness was applicable. He stated, "I didn't think that it was this successful." Carol mentioned how the mindfulness practices helped her appreciate the breadth of how mindfulness

could be practiced or applied. She mentioned, "I saw [it] as meditation essentially […], but it was nice to just see it specifically outlined […]. I was like, wow, there's so, so many different things. It really is a very broad practice that I didn't appreciate at first."

Similarly, Amy declared, "I think I learned more, because at first, I was like, oh, well, it helps with this. And then I was like, oh, well, it also helps with this, and this, and this, or you can do it this way, instead of this way." Carol confirmed this broadening in her perspective by saying, "Mindfulness isn't just sitting down and, like, being all meditative. You can do it while doing something outside." Both Julie and Keith mentioned learning unexpected new options for how to practice mindfulness that they had not thought of before, which opened them up to exploring it further. Keith said it even changed his perception of how accessible mindfulness meditation was to him.

This new, broader perspective of mindfulness that participants developed was related to both the ways of practicing and the context in which it applied. For example, Heather said she started the course expecting that mindfulness meditation would help her in the school context but realized it could do more than that. She went on to say, "Maybe I'm stressed at school, but I've taken it out on my boyfriend, and I shouldn't. So, if I could practice it, so, like, it doesn't help with just school, it helps with managing your life and school. So, I think it opened it, it opened up to that." Florence also expressed this broader understanding, saying, "It's not just for school. It's outside of school too."

I found statements in participants' written reflections that corroborated this interpretation. Seven participants wrote about learning that mindfulness meditation was more than what they thought it was, broadening their perspective beyond their initial assumptions. For example, Brenda wrote that even though she had heard of mindfulness

before, she was unclear about the benefits until *Mind-IT* helped her learn about them.

Moreover, she wrote that after learning with *Mind-IT* she became interested to see how

mindfulness meditation would impact her happiness and stress levels. Denise wrote about

the broader understanding that *Mind-IT* helped her attain: "I have learned actually quite a

bit through this course about the evidence behind mindfulness practices, the different

ways that mindfulness meditation is useful, and the ways that mindfulness meditation can

benefit us." This new, broader vision that mindfulness meditation is a tool for overall

well-being instead of only stress reduction was echoed by many participants in the study.

Carol wrote about learning that mindfulness meditation could help her protect her mental

health. Evelyn reflected: "I hadn't really thought about how lower stress and more control

of our mental state could help treat depression." Both Florence and Gloria wrote that they

learned with *Mind-IT* how extensive the benefits of mindfulness meditation were.

Heather summarized her experience with *Mind-IT* by writing that she learned about an

array of benefits of mindfulness meditation that went beyond her initial idea of simply

lowering stress and anxiety. She particularly pointed out learning about the benefits of

mindfulness meditation in terms of higher life satisfaction and increased empathy.

Mindfulness as Normal. Participants also talked about how practicing produced

a shift in how they thought about mindfulness meditation, gaining the sense that it is

normal to meditate. Keith talked about this shift in perspective in the focus group, saying,

"If you see someone [meditating], like, if you don't know, it's kind of, okay, he's, he's,

he's interesting [skeptically]. And then you do it. Like, no! This is actually a real thing.

It's actually valuable. And that was, that's kind of my experience." Both Lucas and Keith

mentioned in the focus group interview that their learning experiences with *Mind-IT* led

them to lose their doubts about mindfulness meditation being a practice they valued and wanted to have in their lives. Lucas even suggested that *Mind-IT* should be offered to all Veterinary Medicine students during their orientation week as a resource. He went on to argue that "then people would actually get rid of that stigma before they even get there. They would understand it. […] I think it's… just something the school should say, hey, this is going to benefit you through school, you should probably, like, get this."

The new, surprising information that scientific evidence supported mindfulness meditation served to validate the conceptual shift that made mindfulness normal for a couple of participants. Amy and Keith talked about reframing their assumptions of mindfulness from being something out of the norm once they saw scientific evidence. Amy revealed that "at first I kind of thought, like, oh, this is like a hippie thing, right? [laughter] Now I'm like, oh no, wait, this is actually, like, science-based." Keith also said, "I wasn't completely sold on this until the scientific evidence part came up." He also stated that knowing that science confirmed the benefits and usefulness of mindfulness meditation gave him some relief, "almost as if it was at least a shade of peace of mind." He also mentioned that having a variety of options to practice mindfulness helped dispel the myths that people might believe about mindfulness meditation. He said:

> Because when people think about mindfulness, you think about, oh, is this kooky yogi, is going to, like, walk us up a mountain, and like... That's like, that's what people think of. And then you realize, no, it's actually just being present when you're eating chocolate. And, like, oh, there's [taste of] cherry, and then there's, there's, you know, there's… you know, coffee and notes. And like, it's just being present, like, mindful! And so, I think just, have just seen that, like, oh, you don't have to, you know, sit with your legs crossed and your arms out like this [on his lap with thumb and index fingers touching] to benefit.

In encountering new information about the variety of mindfulness meditation benefits and practices, Julie changed her assumptions and started to contemplate

practicing it. She said that before *Mind-IT* she thought of mindfulness meditation as "kind of, like, kooky almost, you know? It's usually associated with that kind of thing. It's like, [for] the people that are very obsessive about essential oils or whatever." But now she sees it differently, as she said that "seeing the benefit of it, like, being able to be like: oh, yeah, this might actually, like, work in this, in this, in this way, kind of helped me go: you know, it's something I might actually try!"

The experience Lucas had, as he talked about it in the focus group, helped change his initial perception that mindfulness "was going to be like a hypnotist type thing." He continued: "And then it wasn't. It was just… Okay. I'm just listening. I'm breathing. I'm calming down. […] So yeah, it's not what I expected." Julia and Keith also talked in the focus group about how they now felt it was normal to practice mindfulness meditation in the classroom, which they did. Keith stated that even though some women from a different cohort—not enrolled in *Mind-IT*—laughed when they were practicing it in the classroom, it "wasn't a big deal." Julia went on to say that she felt comfortable practicing in the classroom, especially because some of the participants enrolled in *Mind-IT* started doing it together. She said: "I'll be, like, yeah, I can close my eyes and take some deep breaths, like... And not only do I know these people but, like, it's not a weird thing to do."

Six instances in the written reflections supported that participants shifted into perceiving the practice of mindfulness meditation as normal, especially because they found it accessible. Amy, for example, wrote: "Through participation in this course, I have found that mindfulness meditation can be accomplished at any time, in any location, by anyone." Florence stated: "This course has really taught me that mindfulness is not hard. Mindfulness doesn't take very long. And yet, the benefits are huge." Three other

participants wrote about similar shifts in their thinking to perceive mindfulness meditation as a normal activity, such as Gloria, Lucas, and Keith. Lucas's reflection showed this shift clearly with the statement "I seriously thought mindfulness was, for lack of better words, kind of a weird thing that extreme naturalists and hippies did. After this course, I realized that it's just helping people take a breath and compose themselves."

Change in Ways of Experiencing

Another essential theme I found in the data was a shift in how participants experienced mindfulness meditation as they participated in the learning activities of *Mind-IT*. As they established personal connections with mindfulness and further engaged with the practice on their own, they learned through experience that mindfulness meditation could benefit them and introduced them to different ways of being. This shift led participants to experience mindfulness meditation as personal.

Mindfulness as Personal. The contemplative learning practices of *Mind-IT* that invited participants to self-reflect on the benefits of mindfulness meditation as they learned and practiced helped them shift perceptions and see how mindfulness meditation worked for and related to them individually. More than being broad and normal, mindfulness meditation became personal. Three participants, in perceiving that mindfulness meditation worked for them, framed it as their personal practice. Keith, for example, said that in the beginning he felt funny practicing mindfulness: "Even though I was in my own apartment by myself, it felt kind of funny. But no, this is actually… I don't care what anyone thinks, this is worth it."

Lucas also confirmed the change, saying, "It's no longer a 'you do that?' It's, it's 'that's cool! I'm glad that's working for you.'" Julie also noted that mindfulness "doesn't

have to be a separate part of your day, which I kind of thought [it] had to before that."
She also mentioned deciding to experiment and incorporate mindfulness practice into running—her personal activity—and expecting at first that it would "be a crappy run," but afterward realizing that it made her "actually [feel] really good."

Three other participants experienced benefits of practicing mindfulness in an unexpected way. That is, mindfulness meditation helped them be more awake and focused rather than sleepy. Amy had an experience that, as she said, took her by surprise. She said, "I'm like: oh, I'm gonna lay down and close my eyes, so I'm gonna fall asleep. I was, like, really surprised that afterwards I felt, like, more awake, like, more focused, like, to go studying." Feeling ready to go back to studying was also Carol's experience. She explained that after practicing she felt "in a place that I could productively study," even though not she did not feel extremely excited about it, whereas before practicing, she felt she had no energy left. Julie also described how her felt experience was different from her expectations of what practicing mindfulness would feel like:

> And you're better able to focus because you didn't get stuck up in, like, the minutiae of, like, all these, like, little things. And like, oh, I need to be here, and here, and here. It's just like, focus on this, and then this, and then this. And so, it made me prioritize. And so, I thought I was going to be, yeah, like, I was going to be all sleepy, but it actually helped me to focus.

Seven participants also stated that they experienced a shift from feeling anxious to being more present, calmer, and better able to handle tasks at hand. For instance, Julie said that after a breathing practice, she transitioned from feeling anxious to feeling focused and able to bring her attention to what she needed to do in the moment. Denise declared being more relaxed: "I really did feel more calm. I'm like a pretty urrr [*electric sound*] kind of person, you know. I feel fairly tightly wound most of the time. And I did

not feel as tightly wound after pretty much every mindfulness exercise that I did." She

also stated that even if she felt anxious, after *Mind-IT* she was able to "handle it more."

Brenda also felt that *Mind-IT* offered a toolkit she could use to be less anxious and

stressed. In her words:

> It's nice to know you have those [tools]. It's like a little toolkit you have and you're, like, when you are feeling, you know, those feelings, like we're saying, we're like: I'm not okay, I don't know what's going on. I'm anxious. I'm so stressed. And to know that you have that as an outlet, that toolkit to bring in, and to possibly decrease that anxiety or that stress.

Keith similarly felt the personal benefit of mindfulness meditation through his

learning experiences with *Mind-IT*. In particular, he said in the focus group that he felt he

could rely on mindfulness meditation as an accessible, fast resource to decrease anxiety

and stress. In the focus group, both Florence and Heather said they felt that learning

mindfulness meditation with *Mind-IT* gave them confidence that they had a tool to

successfully take on the challenge of graduate school. Brenda talked about her skepticism

about mindfulness meditation before *Mind-IT* and her shifting perception as she

experienced feeling less anxious and better able to focus while learning. She said, "I'm

kind of, like… oh, yeah, it helps anxiety, whatever. You know? […] But then, when you

actually feel yourself less anxious, when you focus, especially when I was in classes, and

I made sure that my attention was just there." Lucas said in the focus group that one

mindfulness meditation practice helped him be less reactive. According to him, he gained

perspective over a situation by practicing a breathing exercise he learned in *Mind-IT*. He

said, "It was nice, because it just gave me a second to think: yeah, this is scary, but at the

same time, like, it's not as scary as what I was thinking it was."

This theme was present also in the written reflections data, as eight participants wrote about recognizing mindfulness meditation as a personally meaningful tool. These participants wrote about feeling more prepared to handle life and school after learning experiences with *Mind-IT*. Amy stated in her reflections that even after a short mindfulness exercise she "noticed an immediate difference in my levels of stress and my ability to focus. I felt better prepared to move forward with my evening and was significantly less stressed." She also said that learning mindfulness meditation helped her be more focused in class and more efficient in her tasks when at home. Three participants wrote about mindfulness being a personal tool because they felt that practicing it helped them be more productive. Brenda wrote that practicing mindfulness meditation with *Mind-IT* "has increased productivity and decreased overall anxiety." Carol also had this shift and wrote that she felt the more she practiced and trained her mindfulness skills the better she would be at focusing and accomplishing what mattered to her. Denise's reflection also talked about feeling more focused and calmer with mindfulness meditation, even with little practice. Similarly, Julie's reflection showed how practicing with *Mind-IT* had helped her be more productive, manage her time, and better prioritize tasks because mindfulness brought her the necessary pause and relaxation. She said: "By meditating during the last video [in *Mind-IT*], I felt a huge weight be removed from me, and I already felt I was better able to focus on this [brief reflection] assignment."

Three other participants wrote about their personal take on mindfulness practice as permission to rest. Evelyn, for example, wrote that mindfulness meditation brought her the possibility of managing time in a healthier way. She wrote: "I found that taking a minute to focus on my breathing and body and letting the days worries slip away quiets

my mind and allows me to fall asleep faster (for the most part)." In fact, being able to sleep better was one way in which the other two participants felt mindfulness meditation was personal because they used to struggle with that. Lucas wrote: "Though this hasn't cured my anxiety, ADHD or insomnia, it has made them more manageable." Iris similarly felt rested by learning with *Mind-IT*. She wrote that after watching the videos and doing the breathing exercise in *Mind-IT*, she felt relaxed enough that she fell asleep for the night. She also stated in her reflections that she felt "mindfulness is a very powerful tool all [students] have the ability to learn and use in [their] lives."

Change in Ways of Interacting

The ultimate change individuals might experience with transformative learning is related to their actions. In shifting thoughts and feelings, participants might change or intend to change their behavior to be aligned with their new understandings and perceptions. I found in both the focus group and the written reflections data that as participants learned with *Mind-IT* and experienced a shift in their thinking and feelings about mindfulness meditation, all of them expressed the intention to practice mindfulness meditation. However, not all of them autonomously or consistently acted on their intention to practice due to perceived difficulties with time management, indicating that *Mind-IT* may need to offer more support to help participants shift their behavior.

Intention to Practice Mindfulness. Participants in *Mind-IT* were asked to consciously choose whether to practice a mindfulness meditation exercise at end of the course. Although practicing mindfulness was not required or compensated for in the study, all participants decided to practice when asked to choose. Moreover, 10 out of 12 participants chose to continue receiving email notifications to remind them to practice

even after the end of *Mind-IT*. This conscious choice indicated that participants had the intention to practice mindfulness.

Additionally, seven participants stated either in the focus group or in the written reflections their intention to practice or their intention to be mindful. Brenda, for example, stated that after learning about mindfulness meditation she decided to incorporate in her life the practice of being aware of her mental judgment and more present to the moment. She continued, "I really made that a priority when I'm in class. I found myself way less stressed because I wouldn't be thinking: my gosh, I'm in class, I could be doing this, this, and this." Amy said that when she started *Mind-IT* she was doing the course activities at the end of the day because studies were a priority. However, as she noticed the practices helping her to feel more productive, "later on, I was, like, no, let me do [mindfulness] first, so I study more efficiently." Julie talked about how her intention to practice made her set up time and space for mindfulness meditation:

> I sat my computer to the side, let it play its thing, and so, I just heard [the practice audio] and closed my eyes, so that I wasn't looking at a screen. Cause I thought about that too. I was, like, I don't want to be looking at the screen. I don't want to be, like, with any of my study materials. Like, I put everything to the side. And I was, like, okay, I'm just gonna focus on this.

In feeling the benefits of practicing mindfulness, participants went beyond what *Mind-IT* was suggesting in terms of practice. Some participants adapted what they learned and reengaged in mindfulness when and how they chose to. Amy said in the focus group that she started to use the breaks between classes to practice on her own, based on mindfulness exercises she had learned with *Mind-IT*. She defined these breaks as her "own private little mindfulness to try and wake up before my next class." Lucas stated that he had no doubts that mindfulness worked and started to practice it whenever

he felt he needed to. He described practicing when stressed in a school setting: "Right now all I have to do is breathe. I did that. I did that in yesterday's lab." He stated his intention to engage in mindfulness and said that he practiced independently of *Mind-IT*. In his words: "I didn't actually open anything up. But I started thinking, like, okay, I'm going to run through the breathing exercises that I learned […]. And so, I did that."

This change in behavior was present for seven participants in the written reflections. These participants wrote about either actively choosing to be mindful after learning with *Mind-IT* or setting the intention to practice more and develop the skill to become mindful. Four of these participants wrote that they chose to practice the mindfulness exercises available in *Mind-IT* several times even though there was no requirement for practicing more than once. Lucas, for example, stated that he chose a few different practices to engage with and that in class now he often counted his breath to calm down and decrease anxiety. Denise wrote that she continued to revisit the practices and Evelyn said she has been using the guided meditation for sleep every night. Brenda stated that after she watched the introductory videos and learned about mindfulness with *Mind-IT,* she began to consciously make herself be present throughout the day. Keith wrote that his experience with mindfulness meditation convinced him to practice more. In fact, this intention to practice more than just once, to make mindfulness meditation part of their lives, was present in a few of the participants' reflections. Amy wrote: "I'll be using [mindfulness meditation] a lot in the months to come." Brenda stated that she will "most definitely continue this practice." She said that she wanted to practice mindfulness "at least once daily to build it into my routine." Florence wrote that she was looking forward to trying more of the mindfulness exercises in the future. Similarly, Lucas wrote:

"I intend to use it a lot. I might fall out of practice and forget to do it every day, but it is something that I want to continue doing." And Keith said his intention was to try all the practices offered in *Mind-IT* in the weeks following the end of the course.

Difficulties with Time Management. The difficulty in automatically or consistently acting on the intention to practice mindfulness meditation, particularly due to a demanding routine where time is hard to manage, suggested that to help participants effectively change behavior, *Mind-IT* may need to offer more structure and support. Five participants in the focus group interviews indicated that because of their demanding school schedules, it was hard to find the time to dedicate to practicing mindfulness as much as they felt was needed, especially because the practice was not required within *Mind-IT*. In the course, the written reflections were assigned and had a due date, but not the mindfulness practices (because the idea was for participants to engage with them out of their own choice, which generally happened). However, these five participants noted that if the mindfulness practices had been scheduled, it would have made it easier for them to engage more consistently. Carol, for instance, said that because *Mind-IT* did not set up a consistent scheduled practice, she did not practice enough in the beginning to establish a habit. She said that having a due date assignment made her participate in the written reflections, but without the same kind of structure and prompt to engage in the meditation practice it was hard for her to find the time or remember.

Letting the practice be completely self-directed did not support Carol's intention to practice mindfulness meditation, as she said it would be better to "just tell me what to do" when it came to setting a practice routine. Amy also said that figuring out how to set up a working routine with time for all she needed to do was stressful. She said that

because the written reflections were required but not the mindfulness practices, she ended up focusing on writing in the beginning of *Mind-IT*. Iris also mentioned in her focus group that even though she learned the benefits of practicing mindfulness meditation, because school demanded time it made it hard for her to consistently remember and get into the habit of practicing. Her worry over a lack of time and not having things fit her schedule made her even think twice about signing up for the email notification to continue practicing. She said, "Like, I could probably put that time aside, but I don't know. So, that was my only reservation, but knowing, like, you just like send a reminder we do on our own time. That was like, oh, yeah, I want to do that."

Participants talked about the difficulty of managing their busy lives and needing more direction and discipline to get into the habit of practicing mindfulness meditation. Brenda noted that to grow the skill of mindfulness, individuals need disciplined practice, and maybe *Mind-IT* did not stress that enough. In her words, "This does take discipline, it takes you wanting to practice every day, you know? And it may be [helpful to include], like, little reminders daily to practice." Iris, in her focus group interview, talked about the same need to be directly reminded to practice in order to create the habit of practicing mindfulness meditation. Evelyn also noted she had difficulties getting into the practice because of the many things happening around her when she tried it. She understood that practicing mindfulness required her discipline to try more than once.

In the written reflections, four participants also talked about their difficulty with time management and in setting the habit of practice. Carol, for example, stated that she felt it would be hard to take time away from her required intensive study duties to practice mindfulness meditation after *Mind-IT* was over. She wrote: "I know learning

mindfulness will not be a waste of time, but it will be hard to focus on the current moment." Evelyn also wrote that what she found most difficult in learning with *Mind-IT* was to remember to practice mindfulness when not required, even though she recognized that mindfulness meditation worked when she did. Brenda wrote that it was not easy to implement, particularly to remember to incorporate mindfulness into her routine. Lucas similarly wrote: "I realize that it only takes a few minutes to practice, but since I am so new to it, it doesn't come naturally to me in my few moments of spare time." Finally, two of the participants (Carol and Gloria) decided to not receive notifications to remind them to practice mindfulness after the end of the course, suggesting that *Mind-IT* may not have helped these two participants shift their ways of interacting with mindfulness meditation.

In sum, the findings of RQ1a show that, to some extent, participants' experiences with *Mind-IT* brought about transformative learning outcomes. That is, their learning experiences promoted shifts in some of the ways they conceptualized and experienced mindfulness meditation practices. Participants also indicated their intention to act on these new ways of thinking and being. Nonetheless, five participants found it difficult to create the habit to practice, and a couple seemed not to have shifted their behavior to include mindfulness meditation in the routine after the course—at least not by using *Mind-IT*. The following section investigates whether and how participants developed situational interest in mindfulness meditation.

RQ1b: Accounts of Interest Development

The second subquestion of this phase of the study—To what extent do learning experiences with *Mind-IT* help participants develop situational interest in mindfulness meditation?—investigated whether situational interest was triggered and maintained in

participants while they were learning with *Mind-IT*. Based on the four-phase model of

interest development and what it says about developing situational interest (SI), I

segmented findings into three main themes: (1) triggered SI, (2) maintained SI, and (3)

hindered SI.

Triggered Situational Interest

Among participants of the study, the triggering of situational interest in

mindfulness and their enjoyment of learning with *Mind-IT* was an essential theme in the

data. Situational interest appeared to be triggered in most participants by two main

aspects of their learning experiences: feeling an ease in learning with *Mind-IT* and

perceiving novelty and surprise in learning and practicing mindfulness meditation.

Ease of Learning. Four participants talked about the ease they felt in learning

with *Mind-IT* as an aspect that amplified their cognitive and affective experiences. On the

one hand, this perception of ease in participants' learning processes was related to the

instructional design features in the course. These participants said that they enjoyed the

coherent and comprehensible way in which *Mind-IT* brought mindfulness meditation to

them, particularly how content was presented and activities were sequenced in a way that

facilitated their understanding. Denise, for instance, liked the visual aspect of the

information that introduced mindfulness meditation, with videos interwoven in the text.

She said the videos were engaging and allowed her to understand the content more

clearly. In her words, "I feel, like, a lot of this stuff is so conceptual, reading about it is

kind of hard to, like… But hearing it, and watching it, and watching this guy describe it,

it was, like, I feel solidified kind of the abstract ideas of mindfulness." Brenda agreed that

the videos were appealing and said that the sequence of content and activities made sense

to her. She continued: "Then you practiced it right after [the videos], you know, I like that sequential... Okay, I'm seeing how it's building on it. And now I get to practice it. I like that." Carol also felt that the prompts to engage with *Mind-IT* followed a meaningful sequence that allowed for a "very natural progression." Julie also commented that she liked how the content and assignments were laid out in a sequence that promoted meaningful engagement.

On the other hand, nine participants noticed ease due to the convenience of engaging and learning with *Mind-IT*. Many participants talked about the convenience of the course fitting their time availability, which allowed for engagement—defined as focus of attentional resource and identified as one way interest is manifested (Schraw & Lehman, 2001). Amy said, "It was a really good timeline starting out. Like, the first week of school where we've… we've just had our orientation and we're just getting into classes, so our schedule is not super heavy yet." Convenience in these participants' personal routines and needs was an important trigger of their situational interest, especially for engaging with mindfulness exercises that were optional rather than required in *Mind-IT*. Evelyn mentioned that because *Mind-IT* was online she practiced mindfulness when she was in bed and comfortable, which a few other participants also did to improve their sleep. Heather also liked that *Mind-IT* was online because she could access it when she had time and needed it.

Different participants had different needs and still had their situational interest triggered because *Mind-IT* aimed at offering convenient, diverse practices to fit participants' routines and prior interests. Carol said that she perceived the practices as an opportunity to be outside, which was something she felt she needed and wanted to do.

Both Evelyn and Heather appreciated how Mind-IT made it easy for them to bring mindfulness meditation into some of their everyday activities, such as walking the dog or going for a hike. Heather was enthusiastic about wanting to engage when she noticed it was easy to incorporate the practice in her life. She said: "You don't have to put time aside for it. You're already doing it." Julie also felt triggered to practice mindfulness meditation because she could fit it into her life. In her words, "Maybe I can try a couple different ones, because there are obviously ways that I can integrate it into a normal part of my day. Like, I was gonna go for a run anyway, I could use this pre-exercise one, or I was gonna take my dog for a walk."

Brief exercises that could fit into participants' tight schedules made them more willing to engage with mindfulness practices offered in *Mind-IT*. Brenda said that short exercises allowed her to engage with mindfulness meditation throughout her day, whereas long exercises were harder to implement. She continued: "The short actually I found, honestly would be more beneficial because I could fit it in even Sunday morning time." Carol agreed that short practices were better for engagement. She said that short practices were especially good when she felt the hit of anxiety, because in those moments even ten minutes felt like a long time. Keith and Julie also mentioned that brief practices allowed them to engage even when they did not have a lot of time. Julie acknowledged, "You can do it in, like, two minutes, and even that helps." Lucas said the short practices helped him engage between classes, when he felt he needed it. Gloria talked about how brief practices were a gateway for her to engage with mindfulness meditation. She explained: "I like that it was simple and short. […] It doesn't feel like you're trying to jump into anything too big."

Gloria's explanation illustrated another way four of the participants felt ease in learning with *Mind-IT*; that is, they had the perception of investing *just enough* effort to learn, which was especially noted in the collaborative aspect of the discussion board activity. The perceived optimal level of effort seemed to have triggered some participants' situational interest in learning about mindfulness meditation. Carol said with excitement, "I liked just having a little blurb to read about it, rather than having to go in and, like, read the whole article and, like, what they did and all that stuff. It was nice to just get to, like, the meat part, the nitty gritty, I guess." Evelyn mentioned, "It was nice to read one [article]. And then you could… you wrote the summary and then you could read everyone else's summaries, so you could get the information without having to read the article." Julie said in the focus group that she preferred engaging in the discussion activity in *Mind-IT*—where participants posted the summary of an article presenting scientific evidence on a benefit of mindfulness meditation and discussed it with others in the course—and learning about mindfulness meditation through her colleagues' posts compared to reading an article on her own.

The main way in which participants talked about the ease of learning with *Mind-IT* in the written reflections data was convenience, although one participant, Heather, wrote about the coherence and simplicity of the practice instructions. The convenience of being able to practice "pretty much anywhere" was noted by Amy. Heather also wrote that she liked the convenience of practicing "while doing virtually anything." Julie echoed this experience, writing that she learned through Mind-IT that "mindfulness can be applied to most everything in my life." Brenda pointed out in her reflections that shorter mindfulness exercises were appealing and made her practice more often. Lucas

also mentioned in his reflections that he liked the short practices and how quickly they

relaxed him.

Novelty and Surprise. Participants talked about the excitement of novelty and

surprise in relation to both learning new, unexpected information and experiencing the

practice and benefits of mindfulness meditation. Four participants mentioned that *Mind-*

IT was their first opportunity to engage with mindfulness and that they were surprised by

the outcome of practicing it. Amy said that the mindfulness practice video offered on the

introduction page stood out to her because it was her first time practicing and she had

different expectations about how she would feel. Both Amy and Julie were excited about

the practice of mindfulness after their first experience since they actually became more

focused and did not fall asleep. Lucas said he was surprised to feel himself calming down

as he practiced for the first time and noticed that the unexpected sensation got him

interested in practicing more. He then engaged in another practice of mindful eating he

found and stated: "It was really cool to be, like, I didn't know chocolate tasted that good."

Keith mentioned that practicing for the first time with *Mind-IT* was a vivid learning

moment for him because it was such a new experience.

Participants talked about finding out new and sometimes unexpected information

through *Mind-IT* that made them feel enthusiastic about learning. Five participants noted

this sense of novelty due to unexpected topics shared in the discussion, particularly when

their peers brought up research on the benefits of mindfulness meditation regarding

problems they might encounter along the way. Denise said: "We all had, like, a different

idea on how [mindfulness] could apply to us. And so, it brought up things I, like, I didn't

think it was... [a colleague] did the compassion fatigue and I was, like, oh, that is so

true!!" Brenda even decided to share research she found on mindfulness meditation being beneficial for therapists because some of her peers commented that veterinarians are a sort of therapist. She said this new take helped her learn a lot from reading the article. Carol agreed, saying: "I would have never thought about compassion fatigue or the therapist side of it, you know? It's just… I feel like the discussion was the best part out of it, of that assignment." But it was not only within the discussion that participants found new, exciting information. Carol also noted that one of the videos from the introduction to mindfulness got her intrigued and wanting to know more about how mindfulness meditation changes individuals' brains. Denise said she appreciated learning something completely different from her other classes. The newness of mindfulness was a good way, in her opinion, "to get my brain thinking in a different way, a more creative way."

Finally, the other five participants also talked about a sense of surprise in relation to the many ways they could exercise mindfulness in their lives, which motivated them to engage with it. Heather said she was intrigued by the newness in terms of options to practice because she never thought of being mindful while walking her dog as a possible practice. Noticing the variety of practices both allowed for personal engagement, as mentioned earlier, and brought up a sense of surprise and eagerness to experience it. Both Julie and Florence mentioned it was nice to see so many ways to apply mindfulness meditation. Julie continued enthusiastically, "I was really surprised when I scrolled down, like, the whole page that has all the things on it. […] I was curious to see just like, to be like, oh okay, like, let's apply this!" Lucas commented that the list of mindfulness practices "was much bigger than [he] expected." Keith agreed and said that he was not

only impressed with all the possibilities but they also made him more willing to engage with mindfulness meditation.

The perception of novelty or surprise as a trigger to participants' situational interest was also supported in the written reflections data. Amy wrote in her reflections that she "was surprised how energizing mindfulness meditation techniques can be." Heather similarly wrote that she was pleasantly surprised with how relaxed and yet still alert the mindfulness practice made her feel. Julie and Lucas both wrote they were surprised by the calming effect of mindfulness meditation. Learning about unexpected benefits of mindfulness meditation may have triggered participants' situational interest in engaging with the practice, especially if the novel information was relevant or valid to them. Brenda and Carol wrote about being surprised and intrigued by mindfulness meditation helping with the compassion fatigue issue, which they said is common among veterinarians. Similarly, Keith wrote that he was pleased and surprised by the evidence supporting the benefits of mindfulness meditation to medical students such as himself. Heather was surprised that mindfulness meditation has been linked to higher empathy and life satisfaction, which, in her words, "is something everyone wants to achieve!" Denise and Evelyn wrote about being surprised and motivated by the number of benefits that mindfulness meditation can have for emotional and psychological health. And both Florence and Iris wrote they were surprised by the ability of mindfulness meditation to change the brain's physiology, which they found interesting and validating.

Maintained Situational Interest

Maintaining situational interest in mindfulness meditation was another central theme in the data. As participants learned about mindfulness meditation in a holistic and

meaningful way, they forged personal connections and a sense of value that motivated them to reengage with mindfulness meditation over time, suggesting that situational interest was maintained. Two main facets of participants' experiences with *Mind-IT* seemed to have fostered this sustained situational interest: holistic opportunities to engage in meaningful learning, and a supportive community for practice.

Holistic Meaningful Learning. Participants had opportunities to holistically engage with mindfulness meditation through *Mind-IT*. That is, the activities of *Mind-IT* allowed participants to experience the cognitive, emotional, somatic, and relational aspects of learning, which helped them establish a meaningful connection with and a sense of value in the practice of mindfulness. Particularly, in the focus group interviews, participants talked about the different ways in which *Mind-IT* helped them see the personal benefits and value of engaging with and learning about mindfulness meditation. According to Harackiewicz et al. (2016), one way that educational interventions can promote interest is by enhancing individuals' utility value, which is defined as the usefulness or relevance of an activity (e.g., practicing mindfulness meditation) to one's goals (e.g., academic success).

Value arose either naturally from participants' enjoyment when engaging in the learning activity (i.e., intrinsic value), or from recognizing the learning activity as useful and relevant to them, particularly for attaining a personal goal (i.e., utility value). Three participants talked about *Mind-IT* being a valuable resource that they could go back to and engage with at any time they needed, especially to practice mindfulness exercises. Brenda, for example, identified the course as a toolkit to help with emotional well-being. Lucas and Keith pointed out that *Mind-IT* would be a great resource to offer to all

incoming cohorts of Veterinary Medicine during the welcoming weeks, at the beginning of their program. They even noted that compared to other tools introduced to them (e.g., your strengths finder), *Mind-IT* was the most valuable and, in Keith's words, "time better spent and lessons better learned."

The variety of activities that promoted holistic ways of learning seemed to have helped participants engage differently with, learn, and value mindfulness meditation. Eight participants said that the variety of options to practice mindfulness meditation offered in *Mind-IT* motivated them to engage. The different options allowed a personal sense of choice and autonomy that may have activated both cognitive and emotional aspects of learning and helped participants maintain situational interest in mindfulness meditation. Carol said she liked seeing how mindfulness could be practiced for diverse purposes. She confirmed she wanted to try a mindfulness exercise and said that "just seeing the sheer variety of [exercises] made me even more willing." She continued: "I just liked that [*Mind-IT*] gave us options, that mindfulness isn't just sitting at home quietly." Amy was excited to learn the many ways in which mindfulness has supported people and the different techniques available to practice it. Florence said that what made her connect with mindfulness was seeing the different ways it could be applied. Gloria mentioned that different options to practice gave her an entry to mindfulness meditation. Evelyn said that the selection of options to practice got her intrigued about mindfulness.

These participants' excitement about engaging with mindfulness meditation seemed to be heavily influenced by *Mind-IT* offering them a comprehensive list with different types of practices they could try. Lucas mentioned how getting access to the many ways in which he could try mindfulness meditation made him want to engage more

with *Mind-IT*. Keith stated that it "kind of got me excited knowing that I could, you

know, there are all these things to try." Julie also said that seeing the list of options to

practice mindfulness made her excited because she could comprehend ways to "really use

it" in her life. She also noted that the list gave opportunities for practice that would fit any

person. Variety was important to get her engaged, as she continued:

> You've provided all these options! Like, you can do it before a run. Like, that was really cool! Because I was able to be like, Oh, yeah, this really helps. […] Like, we've seen what all of our classmates have said about it [in the discussion], and the way, different ways it can be used. And then here's this, like, not exhaustive list, but, like, this huge list of all the different ways you can use it. And so, I was able to... I kind of was, like, I'm excited and curious to see what I can do.

When participants talked about their learning experiences with *Mind-IT*, seven

stated they enjoyed the autonomy and freedom promoted by the activities and the online

environment. Denise noted that as a graduate student used to doing research, she

appreciated the self-directed nature of learning with *Mind-IT*. Both she and Carol stated

that searching for and choosing a scientific paper to read and share with the group gave

them freedom (the *See for Yourself* activity in *Mind-IT*). They described the activity as

enjoyable and confirmed that without the autonomy to find their own articles, the task

would have felt restrictive. For these participants, self-direction was a crucial facet of

their engagement in the course. Amy said she enjoyed doing the course by herself.

Heather went even further and said she took the course more seriously because she was

doing it by herself and it was her choice. The self-accountability noted by Heather, which

made her engage with intention, was also brought up by other participants. Keith and

Lucas mentioned how important it was that *Mind-IT* asked them to actively choose to

continue practicing mindfulness at the end of the course, because it gave them autonomy

and made them feel accountable. In conversation, Lucas and Keith talked about how they

actively asked themselves and consciously chose to get personally involved with *Mind-IT*

once the two weeks were over.

> *Lucas*: I actually liked the fact that I had... seeing the question, like, do you want to continue or are you done? It made me think, like, do... And it made me think, like, okay, do I really want to continue with this? Is this something that I really want to keep doing?

> *Keith*: And it almost holds you accountable too.

> *Lucas*: Yep. And that's... Yeah, it made me feel, like, if I'm saying yes, then I need to do, to actually try this seriously.

> *Keith*: Yeah, rather than just the course ending and then you're, like, do I really want to? I don't know. And you're, like, oh, but you're forced to, do you want to or not? And, yeah. It kind of, it's like, it's that self-accountability thing.

Freedom to choose was embedded into the design of *Mind-IT* and seemed to have

helped participants actively engage with mindfulness meditation. What is more,

participants' desire to practice mindfulness meditation more often than the other

opportunities offered within the course suggested they maintained situational interest.

Even though there was one exercise offered during the first week, a few participants

mentioned they would have liked to choose a mindfulness practice to engage with sooner

rather than later. Both Lucas and Keith suggested making the list of practices available

earlier in the course to help participants realize sooner the many options they have and

how they fit different people. Lucas mentioned that he would have liked the opportunity

to practice more during the first week of *Mind-IT* rather than just once, especially if

choosing from the list of mindfulness practices.

Another way that participants learned not only cognitively but also emotionally

was via the written reflections. Five participants indicated enjoying the written reflection

activities that prompted them to self-reflect and identify the personally relevant benefits

of mindfulness meditation. The written reflections helped Heather and Gloria clearly identify their challenges and see how mindfulness could be helpful in overcoming them. Gloria stated, "To identify what challenges I actually thought were coming help[ed] me to focus in on actually, like, instead of my brain just feeling stress, to know why I was stressed and honing on what I actually need to address." In a similar way, Evelyn and Iris talked about the written reflections being productive, allowing them to focus rather than be overwhelmed. Iris suggested that the written reflections helped her be less overwhelmed. As she said, writing about challenges was "un-overwhelming. Because you're already feeling overwhelmed. And then it kind of, like, broke it down into smaller pieces." Seeing value in the written reflections helped these participants build perspective and stay motivated to learn mindfulness meditation. Keith mentioned he saw the written reflections as a rare opportunity in graduate school to pause, acknowledge the challenges, and learn skills to engage the next time he happened to notice the same challenges.

The scientific evidence discussion within *Mind-IT* seemed to have been helpful in maintaining participants' situational interest through not only cognitive but also relational learning. Six participants talked about the value of the discussion and the contribution of each participant's perspective on personally meaningful topics in relation to mindfulness. In particular, they enjoyed seeing the science-based benefits of mindfulness meditation regarding issues they could relate with. Gloria, for example, said that the discussion allowed her to learn many ways in which mindfulness meditation could be meaningful. Florence added that seeing them made her want the benefits of the practice. Evelyn commented that there "doesn't really seem to be any downsides [to mindfulness] really." Keith revealed that after the evidence-based discussion he could finally believe that

mindfulness meditation was going to be useful. Evelyn continued that "after reading the papers and the summaries, there's like a really wide range and lots of different benefits. So why wouldn't you want to keep doing it?" Julie put it this way:

> It was really interesting, like, because mine I did, like, I think I did mindfulness and something like focus or distress or something like that. And then reading the ones about, like, depression and anxiety and stuff. I was, like, you know, those are things that I feel, like, are what I felt, like, when I did mindfulness. I was feeling anxious about school and then I did the breathing practice, and then I felt like I could actually focus on what I needed to do, in the task at hand.

In terms of somatic learning that comes from an embodied experience (Kerka, 2002), all but one of the participants talked about mindfulness meditation leading to positive feelings, which brought a sense of enjoyment to the activity that made them want to reengage with mindfulness meditation. For example, Gloria said she first tried short practices and because she had a good experience she decided to try longer ones. Julie said the positive experience of practicing with *Mind-IT* got her more engaged in the course because she felt she was learning from doing. She used mindfulness exercises other times after going through the practice module to center herself and be present when noticing stress. What is more, all participants agreed that it would be helpful to include more practice opportunities in the two weeks of *Mind-IT*, as they felt the benefits and value of mindfulness. Keith said that after he did the first practice and noticed that it was "actually valuable," *Mind-IT* could have suggested at least two more practice times rather than one before the end of the course. Particularly considering the short practices that make mindfulness meditation available quickly and easily, Julie said they could be offered in *Mind-IT* so students could choose when to practice during the day.

The practice of mindfulness was a powerful learning activity within *Mind-IT* to maintain situational interest because participants were able to feel the value of practicing

for themselves. Six participants indicated they enjoyed practicing mindfulness and identified usefulness in it for their own needs and challenges. Carol, for example, found that practicing mindfulness when in bed at night helped her feel calmer and fall asleep. Other participants also perceived the value of mindfulness meditation to help them sleep better or alleviate insomnia. Evelyn and Heather were excited that the mindfulness meditation for sleep did help them have a good night's sleep. Florence and Amy confirmed that it worked for them, too. Lucas said that he suffered from insomnia and that the mindfulness exercise made him fall asleep much faster than he was used to. Participants placed different utility values onto mindfulness meditation as they practiced different exercises in diverse conditions. For instance, some participants noticed that they were better able to study after practicing mindfulness. Amy stated that practicing helped her "feel nice and calm and, like, ready to work." So, even though she started practicing mindfulness meditation at the end of the day, she then changed to practicing before studying. Evelyn said that she got motivated to engage with mindfulness meditation once she did it the first time and noticed the practice helped her feel good and alive. Lucas also felt the same confirmation from practicing—that is, it helped—and that was enough to make him more open and want to engage more with mindfulness meditation.

The written reflections data supported this subtheme of participants' holistic engagement with mindfulness meditation leading to a felt sense of value and meaningful learning with *Mind-IT*. In their reflections, five participants talked about their personal appreciation of the way *Mind-IT* offered a variety of options to practice, provided participants with the autonomy to choose, and helped them learn the specific benefits of mindfulness meditation they valued. Denise, for instance, wrote that she liked the *See for*

Yourself activity because it helped her personally validate the benefits of mindfulness meditation. The affective experience of autonomy contributed to her actively attending to the course activity (e.g., searching for information) and indicated a triggering of situational interest. Keith also wrote that he personally liked finding evidence to support mindfulness meditation because he has, as he put it, a scientist mind. Because *Mind-IT* offered different ways to individually practice mindfulness meditation, many participants wrote about getting personally connected to mindfulness. Gloria, for example, wrote that she chose to engage with a specific exercise of mindfulness for sleep because she normally has a hard time falling asleep. Julie, on the other hand, wrote that she chose to engage with the mindfulness practice for working out because she is a runner. She said: "I liked this experience because it allowed me to center myself prior to heading out on my run." Evelyn talked about being excited to apply mindfulness meditation to help her with issues that she personally struggles with, such as getting distracted and multitasking.

Helping participants create a connection with mindfulness by showing how it could be relevant on a personal level was a design feature of *Mind-IT* to help develop situational interest. Four participants wrote in their reflections that they were hopeful about and interested in engaging with mindfulness meditation because they recognized benefits of mindfulness meditation that they could relate to personally. Carol wrote that learning mindfulness meditation could help her in the veterinary medicine profession. She wrote: "As veterinary students, we have all experienced those [negative] thoughts, so just by learning about mindfulness meditation is already helping combat the negativity." She continued writing about benefits she connected with personally: "Depression runs in my family, so I have always been worried about getting into a depressive state of mind,

but maybe these mindful practices can help me stay clear minded." Denise echoed the personal connection with mindfulness, especially in the context of the profession. She wrote: "It seems very applicable to the struggles a veterinary student encounters, with regards to huge course loads that all require intense attention." The hope of experiencing the benefits of mindfulness meditation seems to have triggered many participants' situational interest. Denise wrote that the hope of becoming more grounded through mindfulness meditation was very appealing to her, as well as cultivating compassion because it is needed in the veterinary field. Evelyn also stated that she "would love to see mindfulness help me improve in those areas [of compassion and resilience]."

As in the focus group data, participants' written reflections suggested that both intrinsic and utility value were part of their learning experiences, the latter being the most common. Nonetheless, four participants wrote about the pure enjoyment of learning and practicing mindfulness. Amy, for instance, wrote about enjoying the guided meditations. One of her statements in the reflections was: "I have thoroughly enjoyed practicing mindfulness as a result of this course." Denise also enjoyed the practices and stated that her "first experience with mindfulness through this course was positive." Keith similarly wrote about having had a very positive experience practicing mindfulness in *Mind-IT*, as did Brenda, who wrote: "[Mindfulness] has impacted my life in a positive manner."

All the participants identified value in mindfulness in their written reflections. It is important here to clarify that reflecting on perceived personal benefits of mindfulness was a direct prompt in their written reflection assignments in *Mind-IT*. Therefore, it is not surprising that all participants wrote about finding value in mindfulness. However, the reflection prompt asked participants to critically evaluate whether mindfulness could be a

helpful skill to develop as a graduate student based on their experience with *Mind-IT*. All participants wrote that they identified through learning and practicing mindfulness that it was relevant and useful to them. The way participants expressed this utility value varied according to their own goals or needs. Ten participants wrote about the value of mindfulness as a resource to reduce stress and increase focus. These participants were excited about the possibility that mindfulness could strengthen their focus and decrease stress, especially because they were enrolled in a very demanding and intense program.

The value of mindfulness meditation for participants was not only related to stress reduction and improved attention. Seven participants found value in mindfulness meditation for general well-being, self-awareness, and life quality. For example, Brenda and Evelyn reflected on the self-care aspect they perceived. Brenda wrote: "I see huge benefits for my sleep, awareness, anxiety, and relationship to myself and others." Florence noted the value of mindfulness meditation in becoming aware of thinking patterns and reactive behaviors that might allow a different response. Lucas wrote that mindfulness meditation was valuable to him because of the benefits to his overall well-being and because it helped him calm down in a personal situation of fear he experienced in the program, where he felt he could lose his dream of being a veterinarian.

Supportive Community. Finally, participants also talked about perceiving support and community as an aspect of their learning experiences with *Mind-IT* that was conducive to personal engagement and learning over time, which helped sustain situational interest. Some participants felt a sense of community with the opportunity to engage in the discussion board with others, particularly because each participant brought a different view about mindfulness meditation in relation to a personally meaningful

topic. Denise said in the focus group that it was eye-opening and exciting to see diverse ideas about how mindfulness meditation could apply to veterinary medicine students. Brenda and Carol liked how people brought different aspects of mindfulness meditation to the discussion through the topics they chose. Carol talked about the richness of the discussion: "We're all so different, but in such a similar field, but we all thought of something different, and [I liked] being able to discuss that with each other."

Openness and curiosity to learn about everyone's chosen topic (i.e., their personal challenge) and seeing how relatable the topic was to the whole group (i.e., challenges that might be pertinent to all Veterinary Medicine students) seemed to have contributed to a maintained situational interest. In her focus group, Florence confirmed that she enjoyed seeing how each different post "intertwine[d] and connect[ed]." Lucas and Julie mentioned in their focus group interview that they appreciated reading what others had posted in the discussion even more than finding their own article. Florence confirmed the sense of community by saying in the focus group that she related to the different posts shared in the discussion about how mindfulness meditation could help because the topics were about the profession of veterinary medicine. Although the discussion posts were not included in the data analysis, these participants talked in the focus groups about them being an important part of their sense of community.

In one of the focus group interviews, participants talked about feeling supported to engage because of the comments I made on their written reflections, as an instructor. Gloria said that the comments gave "a personal touch to the course." Even though the provided comments were general and the same for all participants—with only the names changed—they showed my presence as the instructor, which helped create a supportive

environment for participants' reengagement with *Mind-IT*. Evelyn added: "If we had, like, a question or said something in there, you addressed it, and you're, like, well, you can do this, you know, so, I really liked that a lot."

Even though support and community were felt to some extent within *Mind-IT* through group discussion and instructor interaction, participants in the focus group interviews talked about finding support by sharing mindfulness meditation with others around them. In sharing with others, participants grew their circles of practice; that is, they expanded the community in which mindfulness meditation could be talked about and engaged with, creating their own support to reengage in the practice. Evelyn mentioned that one day a friend from the veterinary program was talking to her about being stressed and not sleeping well. Evelyn then mentioned some of the guided meditation videos in *Mind-IT* and her friend tried the practice. In one of the focus group interviews, participants mentioned that they started practicing mindfulness in the classroom as a small group, and that this encouraged others to maybe give it a try. The conversation started with Keith saying that practicing mindfulness was what he wanted to do and he did not care what others thought. He continued, "Now it's like: I hope you guys do it with me." Lucas and Julie agreed with Keith and said that it was comforting to practice together. Lucas said, "It was actually really cool in class seeing people do it. It was really good!" Julie added, "Yeah, we did our stress relief thing today […]. And not only do I know these people, but, like, it's not a weird thing to do."

In one of the focus group interviews, participants suggested it would have been good to have more group practices as part of *Mind-IT* to help create an even stronger sense of community. The way *Mind-IT* was designed, participants practiced online on

their own, and that was considered part of the trigger to engage, but as they became more comfortable with mindfulness meditation, practicing with others and in person seemed to be an important aspect for maintaining situational interest. For example, Brenda indicated she wanted to practice in person and in a group. She said: "If I had a Sunday night, you know, refreshing myself for the week with other people, and we're all getting together to just reflect and be present. I think that'd be good." Amy agreed and said that the extra scheduled practice they talked about before could be a group practice, in person. Denise also said that group reflections could be added to *Mind-IT* so they could share and discuss their experience of practicing a mindfulness meditation.

When participants shared and noticed other people showing interest in joining them in the practice of mindfulness meditation, it helped to strengthen their own intention to engage. Keith said that a colleague who had not signed up for *Mind-IT* was sitting next to him in the classroom while some of the participants were meditating together. Keith said that he felt good when this colleague joined the meditation because he saw others doing it. In Keith's words: "I have my eyes open, but I defocused. But at the corner of my eye I could see him. And he just, like, looks up and he's, like, oh, everyone's doing this. Okay [and closed his eyes too]." It was not only in the academic setting that participants shared and expanded their circles of practice. Lucas said that after participating in the discussion activity in *Mind-IT*, he and his wife decided to get extra resources to teach mindfulness meditation to their child. In the focus group Lucas told the story of asking his wife's aunt for a reference:

> And she gave us a book that was for kids. And it was, like, I think the book's called *Sitting Like a Frog*. And so, like, we got it on PDF, and it's literally teaching little kids like our three-year-old. Like, okay, sit like a frog. Now breathe in like a frog. And it was, like, super cute! We did that one with my son too.

This subtheme of finding support and community was not as evident in the written reflections data. There was no specific prompt in the reflection assignments that would have led participants to talk about a sense of support and community. Nevertheless, a few participants did refer to the discussion board assignment as being helpful in relating to their peers and the challenges of Veterinary Medicine students in general. In addition, Keith also wrote in his reflections about his relief in finding that mindfulness meditation has benefited medical students, whose situation he could closely relate to because of being a veterinary student. Lucas was the only participant who mentioned in the written reflections that he started sharing the mindfulness meditation practices with his wife and found support in practicing together.

Hindered Situational Interest

Based on the focus group interviews, hindrances to developing situational interest in engaging with *Mind-IT* was also a theme in the data. Participants talked about reasons they were less prone to keep engaging in the activities of *Mind-IT*. The main condition that seemed to have negatively influenced participants' situational interest was frustration.

Experiences of Frustration. Participants talked about learning experiences in which they felt frustrated while performing an activity, which hindered situational interest in engaging. Some of these frustrating experiences were related to spending either more time or more effort than expected on an activity in *Mind-IT*. Although seven participants liked the autonomy and the opportunity to learn through the activity, as noted in the previous section, three participants felt that finding an article took a lot of time and

energy. Gloria talked about her frustration in the focus group and said that finding a

meaningful article was time consuming. In her words:

> I was a little frustrated to be honest, because just by using Google Scholar, like, when I type in, like, the two words, a lot of articles have pulled up I really didn't care about. And it seemed more like scientific presentation of evidence then actually, like, telling me how it could be beneficial, I felt like. And so, it took me a little while of searching and playing with different words to pull up something that I actually liked. But once I found it, like, that was cool. I didn't really like having to find it. […] But my big thing was, I kept finding papers that were more like, methods, and like, result, like, a lot of the data, instead of, like, the conclusions on the data. And I wanted to know what they found out more than I wanted to read how they got their data.

Heather suggested in the focus group that rather than having only the option to

search for an article, *Mind-IT* could have suggested a few papers for those who did not

want to find their own. She said that she also had difficulties both finding and reading the

scientific article. Evelyn found it hard even to read the scientific paper because of the

background knowledge required to make sense of it.

Six participants said in the focus group interviews that they liked learning from

the discussion about the scientific papers because they had access to a lot of different

information through just their peers' summary of the papers, instead of reading the full

articles. However, two participants felt that finding and reading a research paper on their

own was a struggle. Lucas, in his focus group interview, said that reading the article was

his "least favorite thing to do." He said that he did not need more convincing that

mindfulness meditation could be beneficial, that he was ready to engage in practicing it

by the end of the first week of the course, but *Mind-IT* was still focusing on engaging

participants in thinking rather than doing. He said that he was eager to engage in the

beginning and at the end of *Mind-IT*, when there was the list of practices, but he struggled

in the middle of the course to remain engaged with *Mind-IT*. Keith, in the same focus

group as Lucas, had the same conclusion: he did not have any more doubts about

mindfulness meditation being helpful, but in contrast to Lucas, his struggle was not in

reading the scientific paper—he actually appreciated that activity—but in knowing

whether he was practicing mindfulness meditation correctly and to the best of his ability.

Even though participants did not mention in the focus group interviews that they would

have liked or missed having feedback on the quality of their practice, Keith's comment

points to that. Of all the participants in this phase of the study, only one (Carol) said that

practicing the chosen mindfulness meditation exercise was a struggle, likely due to the

level of attention required. Carol said that she chose to practice the mindful dog walk but

felt frustrated. According to her reflection, the mindful dog walk was both exhausting and

distracting. In her words: "I feel like it was a good test of how much I need to practice

mindfulness meditation."

Finally, three participants mentioned experiencing frustration and difficulty

because of technology issues. A couple of these episodes were due to not being able to

gain access to the scientific papers they found through the search engine. Both Gloria and

Evelyn mentioned getting frustrated because they kept finding articles that were not fully

available in Google Scholar and were only abstracts. Of all participants, only Lucas

mentioned difficulties in accessing the videos with guided mindfulness exercises in

Mind-IT through his cellphone. He talked about trying to listen to the meditation practices

on his phone when going to bed but struggling to make the videos work on Canvas, the

LMS used to create *Mind-IT*.

When the survey data were triangulated with the thematic analysis, situational

interest seemed to have developed among participants. According to results from the

Situational Interest Survey data collected at the end of the study (Figure 58, response rate

of 100%), between 75% and 92% of participants agreed that they liked the activities in

Mind-IT and between 67% and 92% agreed that the activities grabbed their attention (i.e.,

triggered situational interest, items 10-14 listed in order in Figure 58). However, one

(8%) participant disagreed and between one (8%) and three (25%) were neutral about

finding the activities very interesting.

Figure 58

Situational Interest Survey data collected after participation in the Mind-IT course
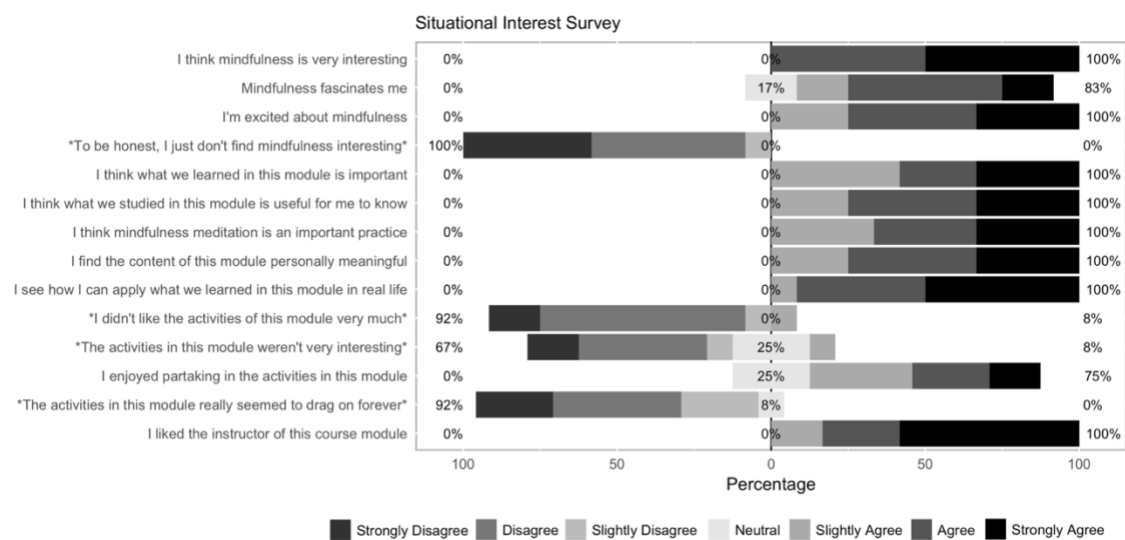
Note. Adapted from Linnenbrink-Garcia et al. (2010). Statements were aimed to assess whether participants' situational interest was triggered (items 10-14) and maintained in the dimensions of feeling (items 1-4) and value (items 5-9).

This finding supported the thematic analysis about participants finding that many

elements of *Mind-IT* triggered their situational interest, but it also revealed some

experiences of frustration that hindered situational interest. The one item with consensus

among all participants (item 14, "I liked the instructor of this course module") suggested

that the perception of support from the instructor might have counted as a situational

interest trigger. Almost all participants agreed that the course material on mindfulness

meditation maintained their situational interest (items 1-9 listed in order in Figure 58),

both in terms of how they felt (e.g., engaging and enjoyable) and their perception of value

(e.g., important and meaningful), with only a couple of participants reporting being

neutral about one of the items (item 2).

Figure 59

Participants' opinion on how much they liked each activity in Mind-IT
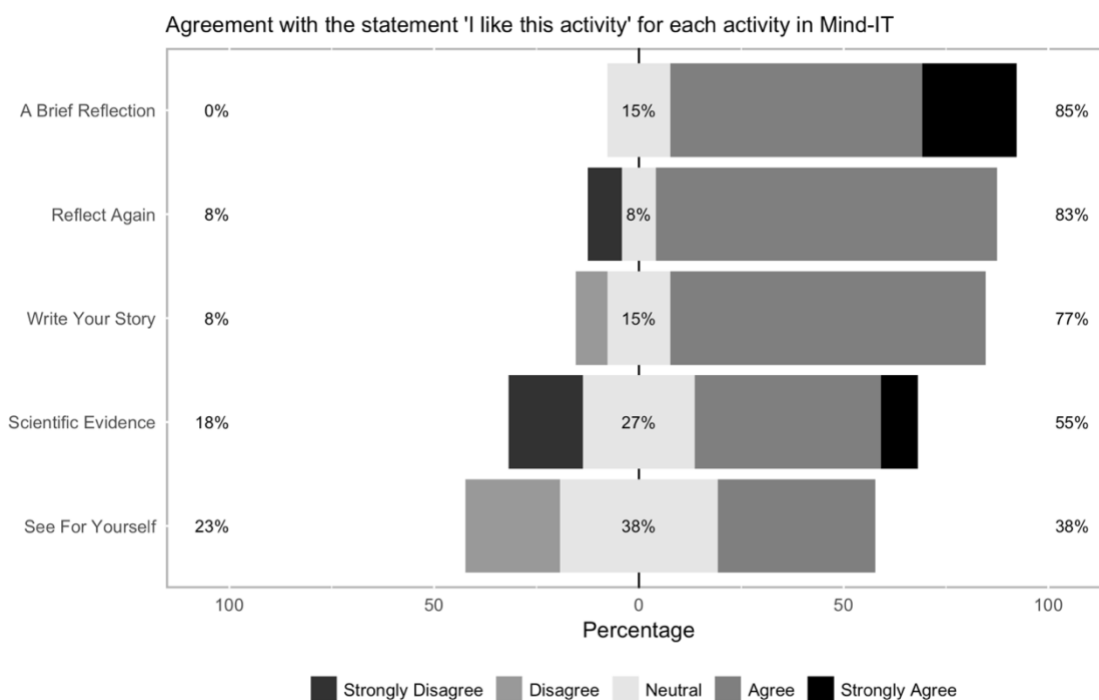
Note. Response rate was 100% for activities 1, 2, 3, and 5, listed in order from top to bottom. Activity 4 (Scientific Evidence) had a response rate of 92%. Answers were submitted immediately after finishing the activity.

Participants' situational interest pertaining to tasks in *Mind-IT* was also assessed

by asking them, immediately after they had submitted each activity, whether they liked

that activity or not and what about the activity they did or did not like. The descriptive

statistics (Figure 59) indicate that participants mostly liked the activities in *Mind-IT*, with

a few exceptions for the two activities related to searching for (i.e., *See for Yourself*) and sharing their summary of a scientific paper (i.e., *Scientific Evidence*). This finding confirmed the frustration experienced over the amount of time and effort spent on the task and over the limitations of article accessibility, which may have hindered situational interest for three participants.

In the activity *See for Yourself*, participants had to search for a scientific paper about mindfulness meditation in relation to a topic of their choice (e.g., stress, performance, depression) and read the article. In the activity *Scientific Evidence*, participants had to write a two-paragraph summary of the article they found and reply to others' summary posts to collaborate in a discussion about mindfulness meditation with science-based evidence. These two activities required participants to engage in more academic tasks that were designed to help them validate new information and see evidence of possible benefits of mindfulness meditation for them. The other three activities, which most participants reported they liked, were all written reflections designed for participants to contemplate their personal stories and connections with mindfulness in a more informal way. In sum, the findings of RQ1b show that, to different degrees, participants' experiences with *Mind-IT* facilitated their situational interest in learning and engaging with mindfulness meditation through *Mind-IT*, even though there was also an experience of frustration that did not contribute to interest development.

Summary of Findings

The first subquestion—To what extent do the learning experiences with *Mind-IT* help participants explore and change perceptions about mindfulness meditation?—aimed

to investigate whether and under what conditions participants experienced learning in a manner that was transformative, according to theories of transformative learning. That is, I looked at ways that participants shifted how they thought of, felt about, or interacted with mindfulness meditation, with the goal of helping them reduce barriers to engaging with this meditation as a tool for their well-being.

Findings suggested that two main conditions facilitated transformative learning experiences. One was sense of discomfort that led participants to want to overcome challenges and stressful events. The discomfort functioned as a driving force, or initial situational interest in trying mindfulness meditation. Their initial interest met with a second condition of a sense of comfort in learning with *Mind-IT* online since it gave participants a safe and familiar space to explore, learn, and engage with mindfulness meditation in ways and times convenient to them.

Data showed that participants shifted in both their concept and experience of mindfulness meditation as an outcome of transformative learning. Two-thirds of the participants demonstrated a change in their understanding of what mindfulness is and how it works as they learned new, surprising, valid information and practiced the diverse meditation exercises with *Mind-IT*. They recognized that mindfulness was broader than they expected it to be, identifying a variety of benefits beyond stress reduction and ways to engage beyond sitting still. Two-thirds of the participants also appeared to change perspective about mindfulness as it became normal to practice meditation. That is, *Mind-IT* helped participants demystify mindfulness through information and practice, so that they started to see mindfulness meditation as something anyone could engage with, including themselves, as opposed to being "weird" or exclusive to a certain population.

Because participants practiced on their own and connected personally with the topic through the activities in *Mind-IT*, they learned through experience that mindfulness meditation could benefit them and introduced them to new ways of being. Two-thirds of the participants felt mindfulness meditation worked for them and offered relevant benefits, shifting their experience to perceive mindfulness as personal. As a result of mindfulness exercises, participants stated that mindfulness meditation helped them be more focused and calmer in both school and life situations.

In terms of change in ways of interacting, the data demonstrated that all participants had an intention to practice mindfulness meditation, which suggests a shift in behavior in line with their new perspectives and experiences. However, one-third of the participants did not autonomously or consistently act on their intentions. Difficulties with managing their time and demands indicated these participants may need more support from *Mind-IT* to change their ways of interacting.

The second subquestion—To what extent do the learning experiences with *Mind-IT* help participants develop situational interest in mindfulness meditation?—aimed to investigate whether and under which circumstances participants developed situational interest in learning and practicing mindfulness, based on the four-phase model of interest development. In general, participants appeared to develop situational interest—that is, they had their interest triggered about mindfulness meditation—and as they learned and practiced, they maintained situational interest and reengaged over time with either *Mind-IT* or mindfulness in general. However, five participants described difficulties learning with *Mind-IT* that hindered their situational interest. *Mind-IT* did not require scheduled mindfulness exercises to help them get into the habit of practicing consistently.

The analysis suggests that situational interest was triggered when participants encountered novel and surprising information and experiences as well as when they felt ease or convenience in learning with *Mind-IT*. Brief mindfulness practices that fit into their tight schedules, for example, eased participants into trying mindfulness meditation without feeling the burden of spending too much time and effort to do so. Furthermore, experiencing novelty and surprise while learning with *Mind-IT* and engaging with the practice of mindfulness meditation was particularly triggering and made participants excited about the topic, feeding a sense of enjoyment and positive affect.

As participants had opportunities for holistic and meaningful learning through *Mind-IT*, they established personal connections with mindfulness and perceived value that motivated them to reengage with mindfulness meditation over time, indicating they maintained situational interest during the course. Feeling directly and personally connected with the topic, and having choice, helped participants engage with activities in *Mind-IT* that promoted cognitive, emotional, somatic, and relational aspects of learning. Through this holistic meaningful learning, all participants saw the benefits and value of mindfulness that drove their reengagement with the practice. Moreover, ten participants (83%) opted to receive a notification to keep practicing after *Mind-IT* ended. Participants also felt reengaged with mindfulness and maintained situational interest by feeling a supportive community when they were exposed to each other's views on the discussion board, were aware of instructor presence, and shared mindfulness meditation with others.

Finally, one-third of the participants reported frustrating experiences that hindered situational interest. These frustrating experiences were related mostly to spending too much time or effort on an activity of *Mind-IT*, but they also resulted from technology

issues that limited accessibility to online content. In the next section, I present the last iteration of *Mind-IT* in this research, which resulted from what I learned from participants' transformative experiences and the situational interest they developed in mindfulness meditation.

Iterations

The fourth iteration of *Mind-IT* was informed by participants' learning experiences in this last phase of the DBR, where I piloted *Mind-IT* to investigate whether participants explored their perceptions and developed interest in mindfulness meditation. The lessons learned are described next and informed an iteration of the design of *Mind-IT* for future research.

Lessons Learned to Improve Design

Based on my analysis of participants' reported learning experiences, both learning novel, unexpected information and experiencing the practice of mindfulness meditation facilitated their conceptual shift to view mindfulness as broad and normal. Further, the more they connected personally with the topic and felt some of the benefits of the practice for themselves, the more their experience of mindfulness shifted, culminating in an intention to practice and incorporate mindfulness meditation in their lives. However, participants found it difficult to get into the habit of practicing mindfulness in these two weeks of *Mind-IT* because the practices were not scheduled and required.

Creating more structure around practicing mindfulness and offering more opportunities for brief exercises, possibly daily, would better support participants in building the habit of practicing. If more structure for practice were embedded in *Mind-IT*

and the option to choose to practice were brought closer to the beginning of the course instead of the end, participants would have more opportunities for the somatic learning of mindfulness, which was an important component of their transformative experiences.

The analysis also highlighted that new and surprising information learned with ease (i.e., effortlessly and conveniently) triggered participants' situational interest, which was maintained through holistic opportunities to engage (i.e., involving cognitive, emotional, somatic, and relational aspects of learning) in a personal, meaningful way. Additionally, finding a supportive community within *Mind-IT* as well as sharing the practice with others to create this space for practice helped sustain situational interest. However, participants' situational interest was hindered by frustration when they perceived activities as too effortful or when they encountered accessibility issues with technology. Thus, easier ways to learn that do not take a lot of time or require too much effort may be more supportive to developing interest. This iteration can be translated into providing different options to access scientific evidence other than searching for and reading a paper, such as reading magazine articles or watching videos that offer similar kinds of information (i.e., grounded in science) but in a more informal language.

To help maintain situational interest, *Mind-IT* could support an increasing sense of community by including a synchronous group practice as an option for participants to come together once a week and practice. For more personal and meaningful learning, the discussion board could become a conversation about their felt experience of practicing rather than simply sharing from their readings of scientific evidence. The science behind mindfulness meditation was important to validate and normalize the practice of mindfulness, but participants did not need to read a full paper to believe that mindfulness

meditation offered them benefits. The aspect of the scientific evidence discussion that participants appreciated the most was simply being able to relate to each other.

I conducted this pilot study to answer the third question posed in this DBR— To what extent do learning experiences with *Mind-IT* help participants change their perceptions of mindfulness as well as develop situational interest in the practice? Findings from the thematic analysis of participants' learning experiences with *Mind-IT* and other data triangulation helped advance the design of *Mind-IT* to introduce mindfulness meditation to students in Veterinary Medicine. After this third cycle of DBR, I adjusted the conjecture map to depict the revised relationships between conjectures (Figure 60). This fourth mapping will inform the design of *Mind-IT* for future research.

Figure 60

Fourth conjecture map adjusted based on participants' learning experiences with Mind-IT
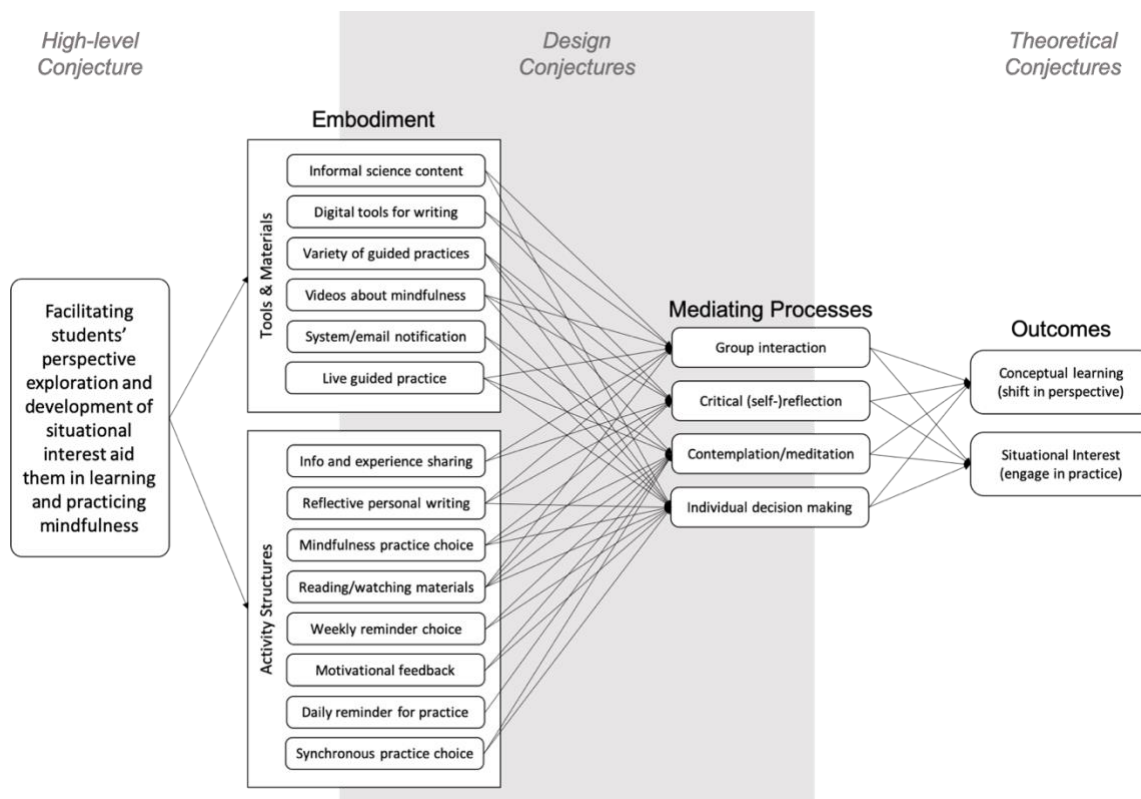
Summary

The purpose of the third cycle of this DBR was to pilot *Mind-IT* and identify whether and how participants' experiences of learning facilitated their engagement with mindfulness meditation. The driving question of this phase was: To what extent do learning experiences with *Mind-IT* help participants change their perceptions of mindfulness meditation as well as develop situational interest in the practice? Through a variety of surveys, written reflections, and focus group interviews, I gathered data about participants' transformative learning and situational interest development in mindfulness meditation. Data were examined using descriptive statistics and thematic analysis.

Findings of this phase suggested that all participants experienced transformative learning—meaning they underwent a shift in perception about mindfulness meditation—but a few participants had difficulties acting on their intentions to practice it. Findings also suggested that even experiencing some frustration with a couple of activities in Mind-IT, participants developed situational interest in mindfulness meditation. Findings were used to iterate *Mind-IT* one last time, offering more structural support for students' engagement with mindfulness meditation.

CHAPTER VIII

DISCUSSION AND CONCLUSIONS

This design-based research study was aimed at developing and iterating on a two-week online course called *Mind-IT* to introduce mindfulness meditation to graduate students. The motivation behind this study is rooted in contemporary learning perspectives that suggest education should engender a holistic approach and provide the ground to cultivate a more conscious society (Barbezat & Bush, 2013b; Palmer et al., 2010; Schonert-Reichl & Roeser, 2016; M. M. Taylor, 2011). On an immediate practical level, due to a greater number of students in higher education reporting a variety of mental health issues (Blanco et al., 2008; DuPaul, Weyandt, O'Dell, & Varejao, 2009; Gallagher, 2014), giving students a tool to self-manage psychological distress seems crucial to learning and well-being in higher education.

The purpose of *Mind-IT* was to help students reduce potential barriers to engaging with mindfulness meditation and develop situational interest in this meditation practice. The frames of this study were transformative learning theory and the four-phase model of interest development, which I integrated to inform the design of *Mind-IT* and interpret the findings. One the one hand, transformative learning through critical reflection and contemplation may allow for exploration and shifts of old ways of thinking, being, and interacting, so that barriers to mindfulness meditation may be reduced (Cranton & Taylor, 2012; Hoggan, 2016; Sable, 2010; E. W. Taylor, 2008). On the other hand, interest can be developed by opportunities to learn mindfulness meditation that stimulate cognitive and affective resources (i.e., triggered situational interest) and help create meaningful

connections (i.e., maintained situational interest) that support reengagement over time (Harackiewicz et al., 2016; Hidi et al., 2004a; Linnenbrink-Garcia et al., 2010).

In the following section, I present my interpretation of how the findings from iterating *Mind-IT* with Veterinary Medicine students are related to the literature review and theoretical framework that informed its initial design. Later in this chapter, I present the implications for design and theory, the study limitations, and a conclusion.

Summary of Findings and Discussion

Here I discuss findings from the study in relationship to Chapter II, where I presented the literature review and theoretical framework supporting this research. As identified in the literature review, mindfulness meditation in higher education has generally not been introduced to students from an institutional approach. That is, mindfulness meditation has not been incorporated into the curriculum, nor have all students been incentivized to practice it for general well-being, as with physical exercise. This condition, in addition to the structural constraints of a discipline-focused academic culture, tends to reinforce the limitations of higher education students in engaging with mindfulness meditation. Thus, I proposed this study to iterate on the design of an introductory online course through three phases, each one guided by a research question.

Research Question One

The first phase of this study functioned as a needs assessment to investigate students' prior beliefs and assumptions about meditation that could represent barriers or enablers to engaging with mindfulness meditation. This phase of the study offered an overview of a representative sample of the Veterinary Medicine student population at the

university where I conducted the research, particularly their background in relationship to mindfulness meditation. Findings indicate that although mindfulness may not have been a foreign concept to the majority of participants, only half reported they would likely practice it if it was offered as an optional activity in a course, suggesting a possible lack of interest. Findings also show that the three main obstacles to meditation among these participants were a perception of mindfulness meditation as non-productive, a perception of having no time, and a lack of clear knowledge about meditation.

While the finding that barriers to meditation exist among university students aligns with previous scarce literature on the topic, this study adds nuance to the understanding of specific types of barriers in this population. Results also reveal different types of barriers for different populations, which have not been previously discussed in the literature. To my knowledge, no previous study has identified the specific barriers to and interest in meditation among higher education students in order to inform the design of a course. Previous studies that have looked at barriers to meditation among university students found that those most likely to benefit from meditation may perceive barriers and be less likely to continue practicing over time (Bork, 2017; Whitford & Warren, 2019). These studies were quantitative and focused on predictors of an average barrier to meditation, but they did not inspect the specific types of barriers most common among university students. Instead, they found that the neurotic personality trait was a predictor of students' barrier to meditation. Other studies looking at barriers to meditation within clinical rather than academic settings showed that different populations have different perceptions of barriers to meditation (A. L. Williams, Van Ness, Dixon, & McCorkle, 2012). Whereas university students in this study perceived time, productivity, and

knowledge as barriers, caregivers' and cancer patients' main barriers were related to inability to stop thoughts, discomfort with silence, and difficulty sitting still long enough.

These contextual conditions for learning mindfulness meditation informed the first design iteration of *Mind-IT* to better address participants' needs (Chapter IV). The iterations included an overview of mindfulness and set a baseline of conceptual knowledge, as well as speaking to the barriers found in the sample, offering brief and informal practices that would not require extensive time.

Research Question Two

In the second phase of this study, I explored common features of top-rated mindfulness applications and evaluated the usability of *Mind-IT*. This phase aimed at refining functionality within *Mind-IT*. The benchmarking evaluation pointed to how other applications engaged their audience; it also informed additional interactive elements to improve the prototype to be tested with potential users of *Mind-IT*. The usability evaluation highlighted design features that could be improved, as well as limitations of *Mind-IT* unrelated to design.

Among the refinements, I included an option to sign up for weekly email notifications after the two-week course to prompt participants to continue practicing mindfulness meditation. Most likely, if *Mind-IT* helped develop participants' interest in mindfulness meditation, it would still be situational. Although to my knowledge no previous study has researched the four-phase model of interest development specifically on the topic of mindfulness meditation, the general model (Renninger & Hidi, 2016) confirms that at this stage of interest individuals still need prompting to reengage with a topic of interest. Another addition to the design of *Mind-IT* was the instructor feedback

on writing reflections to encourage participants to reengage, which is especially helpful in the initial stages of interest development (Renninger & Hidi, 2011; Renninger & Su, 2012) and gives a sense of personalization. Helping individuals connect personally with the content is a premise for developing interest, as research on the four-phase model of interest development has shown (Renninger & Hidi, 2016).

Research Question Three

In the third and final phase of this study, I piloted *Mind-IT* with a sample of students in an incoming cohort of Veterinary Medicine. RQ3 asked about learning experiences with *Mind-IT* and to what extent they helped participants change their perceptions and develop situational interest in mindfulness meditation. I investigated this question based on the integration of two frameworks that I discuss in the following section.

The Integrated Framework of Transformative Learning and Interest Development

Based on the theoretical framework of transformative learning, when individuals are empowered to holistically contemplate old ways of thinking, being, and interacting, their barriers to change are reduced. That is, they feel safe to express their views and are open to exploring alternative ones, so that their perspectives, experiences, and behavior may shift (Cranton & Taylor, 2012; Hoggan, 2016; Sable, 2010; E. W. Taylor, 2008). Based on the four-phase model of interest development, situational interest develops through personal and positive learning interactions with specific content—in this case, mindfulness. Particularly, cognitive and affective resources are aroused (i.e., triggered situational interest) and meaningful connections are made (i.e., maintained situational

interest), such that, having the opportunity, individuals are likely to engage with the topic over time (Harackiewicz et al., 2016; Hidi et al., 2004a; Linnenbrink-Garcia et al., 2010).

As I integrated the frameworks, I suggested that to facilitate openness to exploring and learning new and different perspectives, situational interest might be developed. The analysis revealed that among the conditions allowing transformative learning, two contrasting elements were present: a sense of comfort and a sense of discomfort. While these findings support the transformative learning theory, they also add nuance to the understanding of these premises within the theory.

The sense of comfort stemmed from the course being in an online setting where participants felt safe enough about their privacy to explore mindfulness meditation without fearing others' judgment. Plus, the sense of comfort in learning online was attributed to being familiar with the media. Taylor (2000, 2008) suggested that the environment for transformative learning must promote a feeling of safety, openness, and trust for individuals to undertake critical self-reflection. Boyer and colleagues (2006) investigated transformative learning specifically in online settings and highlighted the specifics of the environment, such as using written language as a means of communication and how it fostered transformation for those who were skilled at it as opposed to those with difficulties expressing themselves in that medium. However, there was no direct association with using a familiar medium (e.g., web-based videos to learn) to promote comfort and strengthen the feeling of trust and openness to learning new ideas and questioning previous assumptions.

The sense of discomfort stemmed from the stress and challenging demands of being a Veterinary Medicine student. Students' awareness of and concern about these

challenges prior to learning with *Mind-IT* triggered situational interest in engaging with mindfulness meditation, to some extent supporting the integrated theoretical framework I proposed. Transformative learning theory indicates disorienting dilemmas as catalysts for transformative learning (Christie et al., 2015; King, 2011; Laros et al., 2017). Because participants in this study were in the incoming cohort of their program, prior to starting the semester—and *Mind-IT*—they had a welcoming week where they were introduced to, among other things, the challenges of being a student in the Veterinary Medicine School. Although the event was planned to prepare students, it distressed some of them and functioned as a disorienting dilemma. The desire to overcome the discomfort drove participants to want to learn mindfulness when it was presented to them as helpful in reducing stress, especially through a self-directed online course designed for them.

Because of this condition, and in contrast to what I expected when designing *Mind-IT*, participants' entry level in the course suggested some initial level of situational interest, which slightly modified the learning context to require less conceptual learning and critical reflection and more opportunities to practice mindfulness. Nevertheless, I found that learning new, surprising information (triggering situational interest) and establishing a personal connection with mindfulness meditation by experiencing and reflecting on the relevance of its varied benefits (maintaining situational interest) helped participants change their perspective. These findings supported the integrated framework, since facets of situational interest development contributed to participants' exploration of and shift in their views and assumptions about mindfulness meditation, particularly recognizing the breadth and the normality of it. Research in interest development has pointed to structural factors such as novelty and surprise as common triggers to

individuals' situational interest (Chen, Darst, & Pangrazi, 2001; Hidi, Renninger, & Krapp, 2004b; Renninger & Hidi, 2011; Silvia, 2001). Even though to my knowledge studies have not investigated the development of interest in mindfulness meditation specifically, it is safe to assume the model would apply to all domains.

In addition to unexpected information, findings show that a feeling of ease in learning triggered situational interest. Ease was felt due to structural characteristics of the course design, such as coherence and comprehension, and a sense of convenience, as the course fitted participants' time availability and needs. Coherence and comprehension have been associated with situational interest development in studies examining text-based or instructional design triggers (Harp & Mayer, 1997; Schraw, Flowerday, & Lehman, 2001; Schraw & Lehman, 2001). Yet the sense of convenience added nuance to the understanding of how situational interest in mindfulness meditation specifically may be triggered. Because in this study a perceived lack of time was an obstacle to meditation, embedding convenience in the design of *Mind-IT* was a deliberate choice to reduce this barrier to engagement with mindfulness meditation. With brief and varied ways to practice, mindfulness meditation fitted into participants' tightly scheduled routines and personal needs, triggering their situational interest and willingness to engage. Additionally, studies examining the effectiveness of brief mindfulness interventions have demonstrated that even short periods of practice may yield immediate benefits to mental health (Call, Miron, & Orcutt, 2014; Cavanagh et al., 2013; Lebois et al., 2015).

Findings of this study show that as participants further engaged with mindfulness meditation in holistic ways—that is, not only cognitively, through conceptual learning and critical reflection, but also emotionally, somatically, and relationally, through

embodied and shared experiences of practice—they established a personal connection

with the content. This connection allowed for autonomy and meaningful learning that

maintained situational interest. Literature on interest development has indicated that a

personal connection with the content is needed to move from triggered to maintained

situational interest, as well as to progress to stages of individual interest (Harackiewicz et

al., 2016; Reber, Canning, & Harackiewicz, 2018; Renninger & Hidi, 2011, 2016). This

result illuminates new possible ways to help individuals establish personal connection

with content—particularly mindfulness—as well as supports the integrated framework, as

holistic education is integral to transformative learning theory (Beer et al., 2015;

Burrows, 2015; Byrnes, 2012; Duerr et al., 2003; Laros et al., 2017; Morgan, 2015). This

holistic perspective suggests that both the teacher and the learner are whole beings "with

not only minds and heads but also hearts and bodies" (Byrnes, 2012, p. 22).

At the same time, as an outcome of holistic learning, particularly of the felt

experience of practicing mindfulness and knowing the benefits of mindfulness meditation

for themselves, participants in this study changed their perception of mindfulness beyond

only the conceptual. That is, they reported a shift in ways of being (e.g., less stressed,

more focused) due to practicing mindfulness exercises that reinforced their sense of value

for the content. The contemplative (meditative) practice of mindfulness together with

self-reflection on the learned and felt benefits of mindfulness meditation facilitated a

genuine personal connection based on perceived utility value. This finding supports the

four-phase model from Renninger and Hidi (2002, 2011, 2016) which suggested affect,

knowledge, and value to be crucial elements of interest development. To be precise, they

claimed that "although affect continues to be important, as interest develops and deepens,

knowledge and value develop concurrently" (Renninger & Hidi, 2011, p. 170). What is more, research in the field has shown that promoting utility value can be an effective intervention to develop interest in different subject areas (Harackiewicz et al., 2016, 2014; Hulleman, Godes, Hendricks, & Harackiewicz, 2010).

The utility value perceived from practicing mindfulness, in turn, promoted a shift in experience that led participants to feel that mindfulness meditation worked and was relevant for them. In support of the integrated framework, as this new, embodied knowledge was experienced and interest developed further with value, transformative learning took place at an experiential level. Participants started to rely on mindfulness meditation as a personally meaningful and valuable resource for their learning and well-being. This result supports research on transformative learning that highlights the importance of extrarational ways of knowing (e.g., somatic, emotional) over logic and rationality (Beer et al., 2015; Hoggan, 2016; Kokkos, 2010). But more importantly, this study adds to the literature by illustrating a process whereby interest development and transformative learning boost each other mutually. In a way, the integrated framework has some similarities with what Pugh (2011) called transformative experience. Yet his construct is not based on the same realm of adult education and does not account for the full range of outcomes of transformative learning. He defined transformative experience as "a learning episode in which a student acts on the subject matter by using it in everyday experience to more fully perceive some aspect of the world and finds meaning in doing so" (Pugh, 2011, p. 111).

Findings from this study show that another way that participants maintained situational interest was through feeling the support of a community. This result supports

research on the four-phase model of interest development, which posits that being part of a group and engaging with others on the same topic or with similar goals enhances interest (Hidi et al., 2004a; Renninger & Hidi, 2011). What is new and more nuanced is that participants in this study not only perceived community within *Mind-IT*, but some of them actively and autonomously built community and expanded their supportive circles of practice outside the online course, by sharing mindfulness meditation with others in person (e.g., peers, family members).

One explanation for this finding might be that the nature of the content they learned (i.e., mindfulness meditation) has the potential to heighten individuals' sense of closeness with others, as studies have claimed (Haynes, Irvine, & Bridges, 2013; Shapiro et al., 2011). Barbezat and Bush (2013c) affirmed that contemplative practices in higher education naturally lead individuals to an increased sense of connection and community. Another explanation might be that participants' experience with mindfulness meditation affected them meaningfully, and they felt the need to share it with others they cared for as a way to give back to their individual communities. Harackiewicz and colleagues (2016) identified that an effective type of intervention to develop interest is personalization, which may involve sharing the learned content with a personally meaningful group, demonstrating ownership of learning. By sharing mindfulness meditation with others, participants maintained situational interest and reinforced their own intention to practice.

Intention to act on a new perspective (e.g., mindfulness meditation is a personal tool for well-being), according to the theory, is an outcome of transformative learning (Boyer et al., 2006; Mathison & Tosey, 2008; Mezirow, 2012). Findings from this study indicate that as participants learned and changed their thoughts and feelings about

mindfulness meditation, they stated their intention to practice it and become more mindful, supporting the literature. This result also implies that their intentions may lead to reengagement over time, which adds nuance to the process of interest development and supports the integrated framework I proposed. In fact, a few participants indeed acted on their intentions by practicing more times than *Mind-IT* suggested within the two-week course, showing an autonomous reengagement with mindfulness meditation over time.

The neurobiological approach to transformative learning, which looks for brain-based evidence of change, claims that transformative learning is deep-seated in learners' interest (Janik, 2005). However, in contrast to the integrated framework I proposed, the focus is on the effects of interest on transformative learning, not on how change might also influence interest development. A study on transformative instructional design presented a model in support of interest affecting transformative learning (Wilson et al., 2007). It suggested that an indicator of transformative learning is an individual's intention and plan for action informed by a positive shift in interest, but it did not suggest an integrated framework where, in turn, transformation feeds into interest development.

A study to investigate college students' beliefs and intentions regarding the practice of meditation identified that students who learn the benefits of mindfulness meditation are more likely to have the intention to engage than students who focus on their stress levels (Rizer et al., 2016). The perceived barrier to practicing was not a significant predictor of intention to practice if benefits of mindfulness meditation were expected. Perceived stress level predicted students' beliefs about health threat, but neither perceived stress nor health threat beliefs directly predicted students' intention to practice mindfulness meditation. This study suggests that having awareness of stress and

communications about stress-related problems may not be effective in promoting university students' engagement with mindfulness meditation. On the contrary, if they learn the benefits of mindfulness meditation, as they did in *Mind-IT*, that intention to engage might be higher.

Still, findings also demonstrate that some participants did not autonomously or consistently act on their intentions to practice mindfulness meditation. Particularly, these participants reported difficulties with time management. A possible explanation for this result is that participants experienced varying levels of interest development, due to a difference either in their entry-level interest or in how the activities in *Mind-IT* helped them develop their interest. Those whose interest was further developed, possibly into an emergent individual interest, acted on their intention to reengage, whereas for those whose interest remained situational, self-regulation to engage without a prompt was not present (Hidi et al., 2004b). This explanation simply suggests that more personalization might be needed in *Mind-IT* to offer more support to those with less interest, without preventing those with more interest from autonomously engaging and deepening their interest (Järvelä & Renninger, 2014).

Another explanation for this finding is that difficulty in acting consistently on their intention to practice mindfulness meditation may have been due to these participants not having experienced a shift in perspective drastic enough to bring about a change in behavior. That is, these participants may have broadened their perspective but not fully transformed their frame of reference (Kitchenham, 2008). In this case, *Mind-IT* would need to personalize instruction for those perceiving more barriers than others, possibly supporting them to increase awareness of the limiting beliefs and assumptions preventing

them from acting on their intention. In fact, Taylor (2007, p. 187) affirmed that to foster

transformative learning in some learners, "communicative learning is in itself not

adequate. Instrumental learning (specific steps, direction) is needed as well to ensure that

students have the necessary skills to act on their new understanding." What is more, a

study analyzing a mobile application for well-being (i.e., Headspace) found that the main

barriers to its use were one's busy lifestyle and negative emotions and perceptions about

mindfulness meditation. The study suggested that the design should consider people's

beliefs, emotional states, and hectic routines (Laurie & Blandford, 2016).

Finally, some participants in the study also acknowledged moments of their

learning experiences with *Mind-IT* that felt frustrating and hindered their situational

interest, particularly when an activity required more time than participants wanted to

give. This result should be expected, since the main barrier I found in the initial phases of

the DBR was a perceived lack of time. The finding also supports the literature on interest

development, which suggests that only when a person's interest is in its later stage (i.e.,

well-developed individual interest) is it less likely that temporary experiences of

frustration will lead to a negative feeling for the content that affects their interest and

engagement (Hidi & Renninger, 2006, 2019).

Implications

By studying the design of a learning environment grounded in a theoretical

foundation and implementing it in a real-world context, this design-based research

contributes to advancing both design and theory. Next, I describe the implications for and

contributions to the design of introductory online mindfulness meditation courses as well as the theory of transformative learning and the model of interest development.

Implications for Design

The implications for design, specifically for introducing mindfulness meditation to benefit students' well-being and learning in higher education, provide some guidelines for online contexts. First, for students to be introduced to mindfulness meditation in a way that facilitates engagement with learning, the online setting may be ideal for those with barriers such as self-consciousness and a perceived lack of time. What is more, providing more holistic ways of learning that promote not only cognitive, but also somatic, emotional, and relational learning allows for opportunities to connect personally to maintain situational interest and validate new perspectives through meaningful experiences.

Second, differential levels of interest in mindfulness meditation call for more personalization and adaptive design so that learners can engage at the stage they are in. That is, individuals with little to no situational interest in mindfulness meditation may need more convenience (e.g., short basic practices, easy-to-access materials, digestible information) to prevent frustrating experiences, as well as more frequently scheduled prompts and directions to engage. Individuals with a more developed interest may desire additional options for longer and more advanced practices as well as need fewer prompts and directions to engage.

Third, a supportive community around the topic, of peers and/or family members, may be beneficial to taking the practice further. Once learners have reduced their barriers and shifted their perceptions about mindfulness meditation (that is, when mindfulness

becomes a normal and valuable activity), creating opportunities for learners to possibly

share the practices and make them more social beyond the online environment may help

develop their interest further and support their intention to engage in mindfulness

meditation in the long run. In fact, meditating in a group is an important aspect of these

contemplative practices (Kurash & Schaul, 2006), particularly if the barrier of self-

consciousness is not present or has been overcome.

Implications for Theory

The theoretical framework I based this study on proposed an integration between

transformative learning theory and the four-phase model of interest development. By

putting theory-informed design into practice, this study expanded on both the

transformative learning theory by incorporating interest development as part of learners'

transformational experiences, and on the four-phase model by assimilating elements of

transformative experiences as part of interest development. The implications for theory,

specifically by integrating these frameworks, offer some insights and contributions.

The study makes four main contributions to the transformative learning and

interest development literature. First, it provides an investigation of interest development

within an adult transformative learning setting. For example, it highlights how situational

interest may be triggered in the balance between the discomfort of a disorienting dilemma

(e.g., confronting the stressful conditions of a highly demanding program) and the

comfort of feeling empowered to meet it (e.g., having a safe familiar space to explore and

validate new perceptions of mindfulness meditation as a beneficial resource). Another

example is that more than helping integrate new information with prior knowledge,

interest may serve as a catalyst for disintegrating prior assumptions and beliefs, helping

adult learners change perspective, especially due to the deepened value that accompanies the process of interest development. Yet another instance where transformative learning may inform interest development, particularly within the subject of mindfulness, relates to the role of embodied or somatic learning in creating personal connection to maintain situational interest and possibly facilitate the emergence of individual interest.

Second, this study offers a more nuanced examination of transformative learning experiences influenced by interest development. For example, situational interest may impact how open learners might be to encountering different perspectives, and to exploring and changing prior beliefs and assumptions. Also, before interest in mindfulness meditation becomes individual, having opportunities to engage without frequent prompts and directions may not be enough within the higher education setting. Yet another example is that creating ways to share mindfulness meditation with peers and family may maintain situational interest and help support learners' intention to engage and their ultimate change in behavior.

Third, the study contributes an empirical example to the literature of interest development in mindfulness meditation as well as of transformative learning. No study until now has investigated interest development within the specific subject of mindfulness meditation. What is more, no research has proposed an integration where interest and perception change inform one another.

Fourth, *Mind-IT* itself is a contribution as a tool designed to support university students in the Veterinary Medicine program to explore assumptions and develop interest in mindfulness meditation. At the most basic level, the Veterinary Medicine program could be supported by offering *Mind-IT* as a welcoming course to graduate students.

Additionally, the design of *Mind-IT* could be further iterated with each implementation and even adapted to different populations within higher education, which could lead to future research on the integration of these two frameworks.

Limitations and Future Work

This study has some important limitations, which I present here. Although the sample of participants might represent graduate students in the Veterinary Medicine program within the university the pool was drawn from, it was not a representative sample of Veterinary Medicine students in general. The race within this university in the Intermountain West is predominantly Caucasian (Data USA, 2017; U.S. Census Bureau, 2018), defining a cultural context for these findings that is not generalizable to other universities. Future studies should focus on more diverse populations to help refine the findings.

Another limitation of this study comes from the recruitment process and the voluntary nature of participation. Only individuals with some initial situational interest enrolled in *Mind-IT*, shaping the selection and consequently the results of the study. Also, most participants in the study were female, which poses additional limitations to the findings, although resembling the Veterinary Medicine School enrollment and a national tendency of women being generally 50% more likely than men to engage in mindfulness practices (Olano et al., 2015). Future studies should attempt to select a more balanced ratio in terms of gender and initial level of interest.

A third limitation refers to the type of data collected in the study. Surveys and interviews are self-reported measures, which ask participants to recollect their

experiences and may not be fully reliable due to individuals' limitations of memory and recall (Hoogerheide & Paas, 2012; Sweller, van Merriënboer, & Paas, 1998). Future research could use different types of data or do a longitudinal study to acquire more data points. This suggestion goes along with a fourth limitation of this study due to data being collected for a short period. Continuing data collection throughout a whole semester or more would help to better understand the development of interest and individuals' engagement with mindfulness meditation.

Another limitation is that this study looked at interest development and perspective shift about mindfulness meditation rather than developing mindfulness itself or the outcomes of mindfulness meditation. No other study has looked at specifically these measures within the same context. Because no other study has used the same methodology in a similar context, there is no comparison study to inform replication of these findings. More studies are needed to investigate the integrated framework of interest development and transformative learning to introduce mindfulness meditation in higher education.

Finally, my role as a mindfulness meditation practitioner and as both the researcher and instructor of *Mind-IT* imposes a limitation to the findings due to an issue of positionality. My enthusiasm about this practice and the way it benefited me as a graduate student may have tinted my interactions with participants and shaped their responses. This may have affected the results of this study, even though I was aware of my biases and exercised personal and epistemological reflexivity to try to reduce my subjectivity (Lichtman, 2017). Future studies could define distinct roles for the instructor and the researcher, or use a research team to prevent this issue.

Conclusion

Studying the design of an online course to introduce mindfulness meditation to university students has several important repercussions for higher education institutions as they strive to provide support for students' wellness and academic success concomitantly. To begin with, this study reveals the importance of a transformative learning approach to help students reduce barriers to engaging with mindfulness meditation, by exploring and shifting their views to perceive mindfulness meditation as a valid, normal, and personally valuable exercise—as much as physical activity is for overall health. The study also demonstrates the interaction of students' interest with their willingness to engage in transformative learning and the practice of mindfulness. Moreover, the study illustrates the integration of both frameworks and the importance of supporting the development of interest with a more personalized design of interaction based on students' level of interest to promote a higher likelihood of engagement.

In light of the original vision that motivated this study—that incorporating mindfulness meditation into the higher education curriculum might benefit learning and well-being but require a shift in students' perception and interest development—*Mind-IT* could be a helpful resource for welcoming programs at universities to introduce mindfulness meditation to novice students. This study reinforces the call to reconsider the role of higher education, highlighting the importance of contemplative practices (Barbezat & Bush, 2013a; Schonert-Reichl & Roeser, 2016) and holistic rather than siloed approaches to learning (Palmer, 2010). This reframe is particularly meaningful considering the increasing rates of reported mental health issues among university students (Lipson, Lattie, & Eisenberg, 2019; Oswalt et al., 2020) and the convenience and

benefits of learning mindfulness online. What is more, because *Mind-IT* is designed to facilitate students' interest-based transformative learning with mindfulness meditation, the resource may help address some of the barriers college students have reported in engaging with online self-help (Levin, Stocke, Pierce, & Levin, 2018).

In conclusion, this dissertation is my first complete study as an independent researcher, notwithstanding the guidance of my committee. The results indicate that *Mind-IT* can support university students, particularly in Veterinary Medicine, in meaningfully engaging in mindfulness meditation by transforming their prior perceptions and developing interest in the topic.

Summary

This study adopted a different lens on introducing mindfulness meditation in higher education, focusing on helping students develop situational interest and change their perceptions about practicing mindfulness. Through an iterative process, the design of Mind-IT was informed by learning context and needs, usability and functionality of web applications, and learning experiences. In this chapter, findings were discussed in relation to prior research and the integrated theoretical framework proposed in this study. In the discussion, I highlighted the results supported by the literature as well as the nuances and unique contributions that studying *Mind-IT* brought to light. I also identified areas for future research to further investigate and develop the design of *Mind-IT* and the integrated theory of interest-based transformative learning.

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APPENDICES

Appendix A. Recruitment E-mail Used in the First Cycle of DBR

IRB#: 9396

Dear students at Veterinary Medicine,

My name is Joana Franco. I am a doctoral candidate conducting research and working with Dr. Mimi Recker, at the Department of Instructional Technology and Learning Sciences.

I am writing to invite you to **participate in a short online survey** and enter the raffle to **win a $50 Amazon gift card**.

The survey aims to investigate the best approach to help students in higher education to learn mindfulness through an online course module. Mindfulness is the ability to be present to life experiences nonjudgmentally. Because studies have shown that mindfulness improve individuals' attention, performance, and wellbeing, I believe all students in higher education will benefit from learning it. You're eligible to be in this study if you are a student of Veterinary Medicine at USU.

If you decide to participate in this study, you will be asked to **complete an online survey** in which you will 1) answer questions on demographic information and prior experience and interest in mindfulness and 2) indicate possible barriers to engage in mindfulness through a 17-item Likert scale. This activity should last **no more than 15 minutes**, for which you will enter a raffle to **win a $50 gift card** compensation.

If you want to participate and enter the raffle, you may click on the following link: https://usu.co1.qualtrics.com/jfe/form/SV_eXwVOMot5dJT9Xf

Remember, this is completely voluntary. You can choose to be in the study or not. Everything you say will be considered confidential. All information will be anonymized, kept in a secured folder, and deleted after data analysis is done.

If you have any more questions about this process or if you need to contact me at any time about participation, I may be reached at joana.franco@aggiemail.usu.edu.

Thank you very much.
Sincerely,
Joana Franco
Graduate Student Investigator
E-mail: joana.franco@aggiemail.usu.edu

Appendix B. Demographic and Prior Interest Survey Protocol (DBR Cycle 1)

1. Age:
2. Gender: (Female/Male)
3. Which of the following best describes you:
   a. White
   b. Hispanic or Latino
   c. Black or African American
   d. Asian or Asian American
   e. Native Hawaiian or Pacific Islander
   f. American Indian or Alaskan Native
   g. Other: _____
4. Full time/Part time student:
5. Do you work? (Yes/No)
6. (if 5=Yes) Full time/Part time:
7. Marriage status: (Single/Married/Divorced)
8. Do you have children? (Yes/No)
9. (if 7=Yes) How many?
10. Are you a native Utah resident? (Yes/No)
11. Are you currently affiliated with any religion? (Yes, but only casually/Yes, formally/No)
12. (if 13=Yes) Which religion are you affiliated with?
13. Have you heard of mindfulness before? (Yes/No)
14. (if 1=Yes) Please select the response that best represents your level of agreement. I have a lot of knowledge about mindfulness. (1=Strongly Disagree, 5=Strongly agree)
15. (if 1=Yes) Have you ever practiced mindfulness? (Yes/No)
16. (if 3=Yes) Please select the response that best represents your level of agreement. I have a lot of practice in mindfulness? (1=Strongly Disagree, 5=Strongly agree)
17. Listed below are research-based outcomes of practicing mindfulness meditation. Which of the following benefits do you find motivating and meaningful to you? Check all that apply. (Reduced stress; Enhanced wellbeing; Improved perception of life quality and balance; Increased ability to sustain attention; Enhanced awareness of cognitive processes; Improved self-regulation; Greater academic performance; Reduced mind wandering; Stronger resilience; Increased empathy; Increased care for others)
18. What might be contributing factors that would influence your decision to enroll in a mindfulness course?
19. How likely are you to practice mindfulness if it was an optional activity in a course? (1=Very unlikely, 5=Very likely)
20. What might be contributing factors that would prevent you from fully participating in a two-week mindfulness course? Check all that apply. (Having family priorities; Having work priorities; Having overload of academic demands; Not having enough time; Identifying religious conflict; Identifying the content as not important; Others: _____).

21. Please, name **at least two** activities (such as hiking, riding horses, doing yoga, reading novels) that you have done for the past couple of years just because you wanted to, not because you had to.
22. Of the listed activities, choose one to share in a paragraph how you became interested in it and what led you to start doing this activity.

Appendix C. Determinants of Meditation Practice Inventory (DMPI)

Instructions: Following is a list of statements that some people may agree with and other people may disagree with. There are no right or wrong answers. Please select the response that best represents your thoughts or opinions.

IT WOULD BE DIFFICULT FOR ME TO MEDITATE BECAUSE…
1 = Strongly Disagree
2 = Disagree
3 = Neither Agree nor Disagree
4 = Agree
5 = Strongly Agree

1	I can't stop my thoughts.	1	2	3	4	5
2	I am uncomfortable with silence.	1	2	3	4	5
3	I can't sit still long enough to meditate.	1	2	3	4	5
4	I prefer to be accomplishing something.	1	2	3	4	5
5	Meditation might be boring.	1	2	3	4	5
6	It is a waste of time to sit and do nothing.	1	2	3	4	5
7	I don't know much about meditation.	1	2	3	4	5
8	Prayer is my form of meditation.	1	2	3	4	5
9	There is no quiet place where I can meditate.	1	2	3	4	5
10	I don't have time.	1	2	3	4	5
11	There is never a time when I can be alone.	1	2	3	4	5
12	I wouldn't know if I were doing it right.	1	2	3	4	5
13	I'm concerned meditation will conflict with my religion.	1	2	3	4	5
14	My family would think it was unusual.	1	2	3	4	5
15	I would feel odd meditating.	1	2	3	4	5
16	I don't believe meditation can help me.	1	2	3	4	5
17	I wonder if meditation might harm me.	1	2	3	4	5

Note. This survey was retrieved from Williams et al. (2011).

Appendix D. Recruitment E-mail Used in the Second Cycle of DBR

IRB#: 9396

Dear students at Veterinary Medicine,

My name is Joana Franco. I am a doctoral candidate conducting research and working with Dr. Mimi Recker, at the Department of Instructional Technology and Learning Sciences.

I am writing to invite you to **participate in 30-minute usability evaluation** for which you will be compensated with a **$10 Amazon gift card**.

The usability evaluation aims to test the ease of use of an online course I am developing to investigate the best approach to help students in higher education to learn mindfulness. You're eligible to be in this study if you are a student of Veterinary Medicine at USU.

If you decide to participate in this study, you will be asked to **schedule an appointment** to participate in the usability evaluation of the online course, by navigating through the modules in the environment and talking out loud as you do it. This activity will last approximately 30 minutes, for which I will provide some refreshments and a compensation of $10 in the form of a gift card.

If you want to participate, you may send me an email to joana.franco@aggiemail.usu.edu to schedule a time for your participation.

The usability evaluation will be audio recorded to facilitate data collection and data analysis. All recordings will be saved in a secured folder and deleted after data analysis is done.

Remember, this is completely voluntary. You can choose to be in the study or not. Everything you say will be considered confidential. All information will be anonymized, kept in a secured folder, and deleted after data analysis is done. Detailed information can be found in the Informed Consent attached in this email.

If you have any more questions about this process or if you need to contact me at any time about participation, I may be reached at joana.franco@aggiemail.usu.edu.

Thank you very much.
Sincerely,
Joana Franco
Graduate Student Investigator
E-mail: joana.franco@aggiemail.usu.edu

Appendix E. Usability Evaluation Protocol

Instructions: In this online module, a series of tasks are planned to help students learn the topic of mindfulness. Please navigate through the learning tasks as they are presented to you in the screen, talking out loud throughout this activity to indicate the cognitive processes of interacting with the online module.

At the end of the module navigation, participants will be asked the following questions about the perceived ease of use of the module and its learning tasks.

1. Could you find all the information you needed to complete each task in the module?
2. Was it easy to get to the contents and tasks from the page you started on?
3. How intuitive and helpful was the navigation in facilitating you find your way through the sequence of content and tasks in the module?
4. Was there something missing you were expecting to see?
5. If you could change one thing in the module, whether it is major or minor, what would it be?

Appendix F. Recruitment Material Used in the Third Cycle of DBR

PowerPoint Presentation

Slide #1

Slide #2

Slide #3

Slide #4

Slide #5

Sign up NOW!

Only **12 spots** available

+ gift card **compensation** (up to **$80.00**, depending on your engagement in the research)

QUESTIONS?

Contact me at joana.franco@aggiemail.usu.edu

Script

Hello - My name is Joana Franco and I am a doctoral candidate conducting research in the Department of Instructional Technology and Learning Sciences at Utah State University. I work with Dr. Mimi Recker, a professor at the Department of Instructional Technology and Learning Sciences.

I am here to invite you to participate in a research study to investigate the best approach to help students in higher education to learn mindfulness through an online course module. Mindfulness is the ability to be present to life experiences nonjudgmentally. Because studies have shown that mindfulness improve individuals' attention, performance, and wellbeing, I believe all students in higher education will benefit from learning it. You're eligible to be in this study if you are a student enrolled in the Veterinary Medicine at USU.

If you decide to participate in this study, you will be asked to participate in a two-week long online module that includes several learning activities and complete two online surveys, one in the beginning and one at the end of the module. Together, the learning activities and the surveys should take about four hours of your time each week, for which we will provide a compensation of $60 in the form of a gift card. Next, we will invite you to attend one focus group where we will ask you to talk about your learning experiences within the module. This activity should last 60 minutes, for which we will provide some refreshments and a compensation of $20 in the form of a gift card.

The focus group will be audio recorded to facilitate data collection and data analysis. All recordings will be saved in a secured folder and deleted after data analysis is done.

Remember, this is completely voluntary. You can choose to be in the study or not. Everything you say will be considered confidential. All information will be anonymized, kept in a secured folder, and deleted after data analysis is done.

Do you have any questions for me at this time?

If you have any more questions about this process or if you need to contact me at any time about participation, I may be reached at joana.franco@aggiemail.usu.edu.

If you want to participate, please sign up for participation using the sheet or email me to sign up at a later time. My phone is (435) 799-1169. You can also call or leave a message there and we will get back to you.

Thank you so much.

Appendix G. Demographic and Prior Interest Survey Protocol (DBR Cycle 3)

1. A#:
2. Age:
3. Gender: (Female/Male)
4. Which of the following best describes you:
    a. White
    b. Hispanic or Latino
    c. Black or African American
    d. Asian or Asian American
    e. Native Hawaiian or Pacific Islander
    f. American Indian or Alaskan Native
    g. Other: _____
5. Full time/Part time student:
6. Do you work? (Yes/No)
7. (if 5=Yes) Full time/Part time:
8. Marriage status: (Single/Married/Divorced)
9. Do you have children? (Yes/No)
10. (if 7=Yes) How many?
11. Are you a native Utah resident? (Yes/No)
12. Are you currently affiliated with any religion? (Yes, but only casually/Yes, formally/No)
13. (if 13=Yes) Which religion are you affiliated with?
14. Have you heard of mindfulness meditation before? (Yes/No)
15. (if 15=Yes) Please select the response that best represents your level of agreement. I have a lot of knowledge about mindfulness. (1=Strongly Disagree, 5=Strongly agree)
16. (if 15=Yes) Have you ever practiced mindfulness? (Yes/No)
17. (if 17=Yes) Please select the response that best represents your level of agreement. I have a lot of practice in mindfulness? (1=Strongly Disagree, 5=Strongly agree)
18. How likely are you to practice mindfulness if it was an optional activity in a course? (1=Very unlikely, 5=Very likely)
19. Please, name **at least two** activities (such as hiking, riding horses, doing yoga, reading novels) that you have done for the past couple of years just because you wanted to, not because you had to.
20. What might be contributing factors that would prevent you from fully participating in the mindfulness course for the two weeks of its duration? Check all that apply. (Having family priorities; Having work priorities; Having overload of academic demands; Not having enough time; Identifying religious conflict; Identifying the content as not important; Others: _____).

Appendix H. Likelihood of Engagement Survey Protocol

1. How likely do you think practicing mindfulness exercises can be beneficial to you? (1=Very unlikely, 5=Very likely)
2. How likely are you to continue practicing mindfulness, it being an optional activity available to you in the Canvas course? (1=Very unlikely, 5=Very likely)

Appendix I. Situational Interest Survey

Instructions: Following is a list of statements that some people may agree with and other people may disagree with. There are no right or wrong answers. Please select the response that best represents your thoughts or opinions.

		Strongly Disagree						Strongly Agree
M1	I think mindfulness is very interesting.	1	2	3	4	5	6	7
M2	Mindfulness fascinates me.	1	2	3	4	5	6	7
M3	I'm excited about mindfulness.	1	2	3	4	5	6	7
M4	To be honest, I just don't find mindfulness interesting.	1	2	3	4	5	6	7
M5	I think what we learned in this module is important.	1	2	3	4	5	6	7
M6	I think what we studied in this module is useful for me to know.	1	2	3	4	5	6	7
M7	I think mindfulness meditation is an important practice.	1	2	3	4	5	6	7
M8	I find the content of this module personally meaningful.	1	2	3	4	5	6	7
M9	I see how I can apply what we learned in this module in real life.	1	2	3	4	5	6	7
T10	I didn't like the activities of this module very much.	1	2	3	4	5	6	7
T11	The activities in this module weren't very interesting.	1	2	3	4	5	6	7
T12	I enjoyed partaking in the activities in this module.	1	2	3	4	5	6	7
T13	The activities in this module really seemed to drag on forever.	1	2	3	4	5	6	7
T14	I liked the instructor of this course module.	1	2	3	4	5	6	7

Note. This survey was adapted from Linnenbrink-Garcia et al. (2010). M stands for maintained situational interest, which comprises two dimensions, feeling (questions 1-4) and value (questions 5-9). T stands for triggered situational interest (questions 10-14).

Appendix J. Focus Group Recruitment Instruction at the End of Mind-IT

After you turn in steps 1 & 2 through this page on Canvas, your course is over. Congrats and thank you for engaging!

Now, to finish your participation in the research study, please fill out the post-course survey (link to Qualtrics survey) as soon as you turn in your final assignment to make sure you are eligible to receive the $60 gift card.

Also, please sign up for ONE of the available focus group dates (link to an external site to sign up for a spot).

Just a reminder, you will receive an additional $20 gift card for your participation in this 1-hour focus group that will take place at the Emma Eccles Jones Education building, room 278. Pizza will be served!

Both gift cards will be handed to you **in person** at the end of the focus group meeting.

Appendix K. Focus Group Protocol

Q#	Frame	Question
1	broad	Tell me about your learning experiences in the past two weeks in the module. Let's think back about the tasks you performed (hand out flowchart). Was there any learning experience during these two weeks that stood out for you? Why?
2	ID	How was it for you to think of your trajectory to get into the program? How interested were you in writing about your journey? Why?
3	TL	How was it for you to imagine your trajectory throughout the program? How did you feel when thinking of all the challenges you expected to face? Was it disorienting?
4	TL	How confusing or difficult for you was it the first time you were asked to write about the value of mindfulness for dealing with those challenges? How so?
5	ID	How was it for you to find a scientific paper to present on your own? How did you feel while browsing among articles? How exciting (or not) was it to dig in information about the topic? Did you like having the autonomy to choose?
6	ID	How did discussing scientifically-based evidence about mindfulness helped trigger your interest in the topic? Was it exciting for you? How so?
7	TL	How did writing about the possible value of mindfulness to overcome expected challenges in your program helped you investigate your assumptions about what mindfulness is? Do you think that the information that you gained brought any shift in the way you perceived mindfulness? How so?
8	TL	Going back to when you had to write about the possible value of mindfulness, do you think that at that moment you considered the possibility of trying out mindfulness? Tell me about it.
9	ID	Thinking back to the moment you were asked if you wanted to try out a practice, what kind of thoughts crossed your mind? Were you immediately interested in trying or was it a decision that took you some time to make? Did the type of practices offered make any difference in your decision? In what way?
10	TL	What were your expectations of it before trying? Was the actual practice anything like what you expected? How so? Did trying a practice change the way you think or feel about mindfulness?
11	ID	After going through this module, do you think you are more interested in learning mindfulness than you were before you started? How so?

Note. ID stands for interest development. TL stands for transformative learning.

Appendix L. Exit Survey Protocol

1. A#:
2. Why did you stop participating in the mindfulness course?
3. Of the list below, which factor(s) contributed to preventing you from fully participating in the two-week mindfulness course? Check all that apply.
   a. Having family priorities
   b. Having work priorities
   c. Having overload of academic demands
   d. Not having enough time
   e. Identifying religious conflict
   f. Identifying the content (mindfulness) as not important
   g. Identifying the content (mindfulness) as not interesting
   h. Identifying the activities of the course as not relevant
   i. Other:

In addition, I used the SIS instrument (see Appendix I).

CURRICULUM VITAE

JOANA FRANCO

EDUCATION

Ph. D. in Instructional Technology and Learning Science (ITLS),　　December 2020
Utah State University, Logan, UT
> *Dissertation topic:* Mind-IT, an online course to introduce mindfulness into higher education
> *Committee members:* Dr. Mimi Recker (chair), Dr. Victor Lee, Dr. Jody Clarke-Midura, Dr. Mike Levin, and Dr. Heloisa Rutigliano

M. S. in Communication and Society, UFJF, Brazil　　　　　　　　Jan 2010

B. A. in Social Communication, UFJF, Brazil　　　　　　　　　　Jan 2005

APPOINTMENTS

Graduate Research Assistant
Instructional Technology and Learning Sciences Dept., USU　　Mar 2015-Dec 2020

Instructor & Teaching Fellow
Instructional Technology and Learning Sciences Dept., USU　　　　Jan-Dec 2018

Assistant Professor
Institute of Arts & Design, Federal University of Juiz de Fora, Brazil　　Feb-Jul 2014
Management & Leadership Dept., Machado Sobrinho, Brazil　　Aug 2010-Jul 2013
Communication & Arts Dept., University Center Estacio JF, Brazil　Feb 2009-Jul 2014

Undergraduate Course Coordinator
Graphic Design, Communication & Arts Dept., UCEJF, Brazil　　Aug 2011-Jul 2013

Designer & Project Manager
In-House Design Studio, University Center Estacio JF, Brazil　　Aug 2009-Jul 2011
Café Azul Digital Media, Web Design Studio, Brazil　　　Mar 2005-Dec 2008

SCHOLARSHIP & AWARDS

Graduate Student Instructor of the Year, Departmental Award　　　　　2019
Instructional Technology and Learning Sciences Dept., Utah State University

MMTC Outstanding Application, Scholarship Award of $4,800　　　　　2018
Mindfulness Meditation Teacher Certification Program

ITLS Research and Development, Scholarship Award of $1000　　　　　2018
College of Education and Human Services, Utah State University

Science Without Boarders, 4-Year PhD Scholarship (Tuition & Stipend).　2014-2018
CAPES Foundation, Ministry of Education, Brazil

Top-Rated Professor, Variable Compensation Award　　　　　　　　Aug 2014

University Center Estacio, Juiz de Fora, Brazil

Honored Professor, Graphic Design Program Graduates   Aug 2013 & Feb 2013
University Center Estacio, Juiz de Fora, Brazil

CNPq Scholar, 1-Year Scientific Initiation Scholarship (Stipend)   2013-2014
National Council for Scientific and Technological Development (CNPq),
Ministry of Science, Technology, Innovation, and Communication, Brazil

TEACHING EXPERIENCES

INSTRUCTOR

Instructional Technology and Learning Sciences Dept., USU   Spring 2018

eLearning Trends and Issues (online; undergraduate and graduate levels)

Topics include: best practices and future trends for online learning and teaching

Institute of Arts and Design, UFJF, Brazil   Spring 2014

Instructional Multimedia (face-to-face, undergraduate level)

Topics include: multimedia production, user experience, programming, web publishing

Management and Leadership Dept., Machado Sobrinho, Brazil   2010-2013

Visual Communication (face-to-face, undergraduate technical level)

Topics include: creativity, visual communication, multimedia, public relations

Communication and Arts Dept., University Center Estacio JF, Brazil   2009-2014

Graphic Design Project (face-to-face, undergraduate technical level)
Topics include: innovation, design thinking, project management, design stakeholders

Art Direction (face-to-face, undergraduate level)
Topics include: visual communication, creativity, graphic design, multimedia language

Information Architecture (face-to-face, undergraduate level)
Topics include: user experience design, user research, wireframing, prototyping

Web Design (face-to-face, undergraduate level)
Topics include: interface and interaction design, website programming and publishing

Surface Design (face-to-face, undergraduate technical level)
Topics include: surface in fashion design, creativity, design patterns, visual communication

Digital Media (face-to-face, undergraduate level)
Topics include: digital communication, user experience, social media, data use and privacy

Digital Image (face-to-face, undergraduate technical level)
Topics include: visual communication, fundamentals of digital image, creation/edition tools

Multimedia (face-to-face, undergraduate technical level)

Topics include: multimedia production, user experience, programming, web publishing

TEACHING ASSISTANT

Instructional Technology and Learning Sciences Dept., USU   Spring 2020
How People Learn (online; undergraduate level)
Assisted reviewing the course material, graded, and moderated students' online discussions

Instructional Technology and Learning Sciences Dept., USU   Fall 2018
Design Thinking (online; graduate level)
Assisted redesigning the course structure and moderated students' online discussions

GUEST LECTURER & WORKSHOPS

Teacher Education Dept., Weber State University   Fall 2020
Mindfulness as a classroom management strategy (online; undergraduate level)
Taught a two-hour workshop for the Educational Psychology and Classroom Management class on mindfulness meditation and its impact on teaching and learning

Transcend Yoga Studio, Logan, UT   July 2020
Introduction to Mindfulness Meditation (face-to-face, beginner level)
Taught a six-hour workshop on the foundations of mindfulness meditation for beginners

Online course, Zoom Platform   May 2020
Introduction to Mindfulness Meditation (online, beginner level)
Taught a six-hour workshop on the foundations of mindfulness meditation for beginners

Elevation Rock Gym, Logan, UT   Nov 2019
Embodied Mindfulness (face-to-face, beginner level)
Taught a two-hour workshop on mindfulness meditation and its embodied practice

The Yoga Tribe (Yoga Alliance Certified School), Logan, UT   Mar 2019
Mindfulness Meditation (face-to-face; yoga teacher training level)
Taught a two-hour workshop on the concept and practice of mindfulness meditation

Instructional Technology and Learning Sciences Dept., Utah State University   Fall 2018
Design Thinking (face-to-face; graduate level)
Conducted an hour workshop on developing empathy using the IDEO Travel Kit

PUBLICATIONS

JOURNAL ARTICLES

Feldon, D. F., **Franco, J.**, Chao, J., Peugh, J., & Maahs-fladung, C. (2018). Self-efficacy change associated with a cognitive load-based intervention in an undergraduate

biology course. *Learning and Instruction*, *56*, 64–72. doi:10.1016/j.learninstruc.2018.04.007 (*peer-reviewed*)

CONFERENCE PROCEEDINGS

Franco, J., & Recker, M. (2018). Interest-based transformative learning: An integrated framework to help university students learn mindfulness. In M. Welsh, V. Marsick, & D. Holt (Eds.), *Proceedings of the XIII International Transformative Learning Conference* (pp. 309-316). New York, NY: Teachers College, Columbia University. Available at https://drive.google.com/file/d/1ip4fXbRrEVfPd8dkvBcmCUv9p-rCdTsv/view (*peer-reviewed*)

Franco, J. (2008). Cultural Capitalism: Overview of the Web 2.0 Growth Value. *Proceedings of the XIII Southeast Region Conference of Communication Sciences*. São Paulo, SP, Brazil. Retrieved from http://www.intercom.org.br

Pimenta, J. F. P., & **Franco, J.** (2004). Mumbai 2004, Political Activism and Genuine Sign. *Proceedings of the XXVII Brazilian Conference of Communication Sciences*. Porto Alegre, RS, Brazil. Retrieved from http://www.portcom.intercom.org.br

BOOK CHAPTERS

Feldon, D. F., Soojeong, J., **Franco, J.** (2019). Expertise in STEM Disciplines. In P. Ward, J. M. Schraagen, J. Gore & E. Roth (Eds.), *The Oxford Handbook of Expertise: Research & Application*. Oxford, UK: Oxford University Press. ISBN 9780198795872.

Poole, F. J., **Franco, J.**, & Clarke-Midura, J. (2018). Developing a Personalized, Educational Gaming Experience for Young Chinese DLI Learners: A Design-Based Approach. In R. Zheng (Ed.), *Digital technologies and instructional design for personalized learning* (pp. 253–274). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-3940-7.ch012 (*peer-reviewed*)

Pimenta, J. F. P., & **Franco, J.** (2006). Mumbai 2004, Ativismo Político e Signo Genuíno. In: A. F. Neto (Ed.). *Os mundos da mídia: leituras sobre a produção de sentidos midiáticos* (pp. 221-231). João Pessoa, PB: Editora Universitária UFPB.

PRESENTATIONS

Franco, J. (2020, April). *Mind-IT: An approach to integrate mindfulness into higher education*. Poster presented at the annual *USU Student Research Symposium* (SRS), Logan, UT.

Franco, J. (2019, March). *Mind-IT: An online course to incorporate mindfulness for student success in higher education*. Paper presented at the annual Teaching for Learning Conference (T4L), Logan, UT.

Franco, J., & Recker, M. (2018, November). *Interest-based transformative learning: An integrated framework to help university students learn mindfulness*. Paper presented at the biennial meeting of the International Transformative Learning Conference (ITLC), New York, NY.

Franco, J. (2018, October). *Mind-IT: An institutional approach for incorporating mindfulness into higher education*. Poster presented at the annual meeting of the

Association for Contemplative Mind in Higher Education (ACMHE) Conference, Amherst, MA.

Franco, J., Feldon, D. F., Peugh, J., & Maahs-Fladung, C. (2017, April). *Cognitive Load-Based Instruction and Self-Efficacy Changes in Undergraduate Biology Course: A Shift in Frameworks' Interaction*. Paper presented at the annual meeting of the American Educational Research Association (AERA), San Antonio, TX.

Urqhart, S., & Franco, J. (2016, April). *Does Cognitive Expertise in Design Exist? Implications for Design Education*. Paper presented at the annual meeting of the American Educational Research Association (AERA), Washington, DC.

Franco, J. (2010). *Interaction and its educational contexts*. Paper presented at the National Symposium of Brazilian Association of Cyberculture Researchers (ABCiber). Rio de Janeiro, RJ, Brazil.

Franco, J. (2008). *Cultural Capitalism: Overview of the Web 2.0 Growth Value*. Paper presented at the Southeast Region Conference of Communication Sciences. São Paulo, SP, Brazil.

Franco, J. (2008). *Communication and Interface: The Need for Aesthetics*. Paper presented at the National Symposium of Brazilian Association of Cyberculture Researchers (ABCiber). São Paulo, SP, Brazil.

RESEARCH EXPERIENCES

CO-INVESTIGATOR (EXTENSION RESEARCH)

Communication and Arts Dept., University Center Estacio JF, Brazil   Aug 2013-Jul 2014
Social Design, visual communication and innovation for local community schools
Funded by UNESA Extension Program Award
Performed activities: Recruited and trained graphic design undergraduate students to participate in the project. Designed and conducted research study and organized study groups. Tutored and supervised students in defined research activities.

COLLABORATOR (GRADUATE RESEARCH)

Instructional Technology and Learning Sciences, USU   Aug 2018-Dec 2020
SchoolWide Labs, a real-time sensing platform for integrating computational thinking into middle school STEM curricula
Funded by NSF. Collaborators: University of Colorado, Boulder
Performed activities: Read on research-practice partnership, computational thinking, design-based implementation research. Collected qualitative data via observation and field notes during professional development workshops. Designed interview questions and conducted focus-groups with teacher-participants of the workshop. Participated in collaborative writing of evaluation summaries and reports

Instructional Technology and Learning Sciences, USU   Sep 2016-Apr 2017
Progressions of skill development in biology doctorates
Funded by NSF. Collaborators: University of Virginia and University of South Carolina

Performed activities: Assisted with document writing and IRB protocol submission. Conducted literature review on expertise development (knowledge, skill, and socialization). Cleaned and analyzed quantitative data (descriptive statistics, ANOVA, and regression). Co-authored a book chapter and papers for journal and conference submission.

School of Teacher Education & Leadership, Utah State University   Jun-Aug 2016
    Cyber-enabled learning, digital natives in integrated scientific inquiry classrooms
    Funded by NSF
    Performed activities: Conducted literature searches and review about teacher professional development. Engaged in collaborative discussion for writing on professional development.

Instructional Technology and Learning Sciences, USU   Jul 2015-Jun 2016
    Integrating expert knowledge and simulation-based assessment for wastewater management training online
    Funded by NSF. Collaborators: Central Carolina Technical College
    Performed activities: Assisted with IRB protocol documentations. Researched and read material on the subject matter to write learning content. Participated in collaborative instruction design based on cognitive task analysis.

Caine College of the Arts, Dept. of Art & Design, USU   Mar-Jun 2015
    Design Thinking, an investigation of expertise in design through cognitive task analysis
    Funded by USU Grant-writing Experience through Mentorship Program
    Performed activities: Assisted with document writing and IRB protocol submission. Conducted literature review on design experts' creative processes and decision making. Conducted and transcribed cognitive task analysis interviews with design experts. Co-authored paper for conference submission.

DESIGN & MANAGEMENT EXPERIENCES

The I-System Institute, Utah State University   2019
    Instructional & Graphic Designer / Designed the Institute's new logo. Redesigning the workbook for the Productive Mind business training. Assisting with design of instruction for the Mind-Body Bridging online course. Designing marketing material for the MBB course.

STE^{2}M Center, Utah State University   2014-2015
    Web & Graphic Designer / Designed and developed website for the Center. Maintained website content and Internet presence for the Center and its events. Produced marketing material for the Center and its events. Assisted with photographic coverage of events.

Graphic Design Program, University Center Estacio JF, Brazil   2009-2014

Course Coordinator / Planned and evaluated curricular activities. Budgeted academic semester schedules. Hired and managed faculty. Monitored academic records of and advised students. Organized extra-curricular activities and events.

Design Studio Supervisor / Supervised internship. Managed design projects. Coordinated team of interns in the studio. Designed graphic and web materials for institutional events.

Café Azul Digital Media, Juiz de Fora, MG, Brazil   2005-2008

Creative Director / Coordinated design teams. Managed projects. Engaged with stakeholders.

Designer & Art Director / Created content, structure, and visual interfaces for web projects.

PROFESSIONAL DEVELOPMENT

Mindfulness Teacher Training, 2-Year Certification Program   Feb 2019-Jan 2020
University of California Berkeley and the Awareness Training Institute

Mind-Body Bridging Training, In-Person Training   Aug-Dec 2019
The I-System Institute at the USU College of Humanities and Social Sciences

Resilience through Caring Connections (RC²) Conference, 1-Day   Jun 2019
Theme: promoting resilience in our community despite trauma

Mindful Education Teacher Training, Online Training   Nov 2018-Mar 2019
Mindful Education LLC

Wisdom 2.0 Conference, 3-Day Conference Participation   Feb 2018
Theme: connecting human lives through technology in ways that are beneficial and useful

Yoga Teacher Training, 200-Hour Training   Jan-Jun 2018
The Yoga Tribe (YA Certified School), Logan, UT

The Power of Awareness, 7-Week Online Mindfulness Training   Jan-Feb 2018
University of California Berkeley and the Awareness Training Institute

Design Thinking, 3-Day Workshop   Apr 2013
Instituto Brasileiro de Mercado de Capitais (Ibmec), Rio de Janeiro, Brazil

Academic Processes and Tools, Online Training   Apr-Dec 2012
Universidade Estácio de Sá (UNESA), Rio de Janeiro, Brazil

Assessment Design, Online Training   Apr-Jun 2011
Universidade Estácio de Sá (UNESA), Rio de Janeiro, Brazil

Teaching Planning, Online Training   Feb-Jul 2010
Universidade Estácio de Sá (UNESA), Rio de Janeiro, Brazil

Assessment of Teaching-Learning Process, Online Training   Oct-Dec 2010
Universidade Estácio de Sá (UNESA), Rio de Janeiro, Brazil

Methodology and Strategies of Teaching, Online Training   May-Jul 2009
Universidade Estácio de Sá (UNESA), Rio de Janeiro, Brazil

Didactics of Higher Education, 7-Week Training   Sep-Nov 2008
Centro Universitário Estácio Juiz de Fora (CUEJF), Juiz de Fora, Brazil

Graphic Design, 1-Year Specialization Degree   Sep 2007-Nov 2008
Centro Universitário Estácio Juiz de Fora (CUEJF), Juiz de Fora, Brazil

Illustration, 6-Week Training   Sep-Nov 2006
Saint Martins School of Art, London, UK

Branding, 10-Week Training   May-Jul 2004
Pontifícia Universidade Católica do Rio de Janeiro (PUC-Rio), Rio de Janeiro, Brazil

COMMUNITY & SERVICE

Mindfulness Teacher, Center for People with Disability, USU   Jan-Dec 2020
Design and teach a weekly yoga class focused on embodied mindfulness.

Mindfulness Teacher, Aggie Recreation Center, USU (*volunteer*)   Sep-Dec 2019
Plan and teach a weekly mindfulness meditation class offered freely to the USU community.

Yoga Instructor, Elevation Rock Gym, Logan, UT (*volunteer*)   Sep 2018-Mar 2020
Design and teach a weekly yoga class focused on embodied mindfulness.

Community Facilitator, Cache Valley Sangha, Logan, UT   Jul 2016-present
Manage visual communications (both web and print) and social media for the community. Facilitate talks and meditation around Buddhism and mindfulness/heartfulness practices. Help organizing meditation retreats offered throughout the year.

Communications Officer, ITSA   Jan-May 2016
Manage visual communications (both web and print) for events organized by the Instructional Technology Student Association (ITSA), at USU

Executive Director, Advanced Design Laboratory, Brazil   Feb 2011-Oct 2012
Co-founding member of an NGO created to disseminate local talents in design to enhance the creative industry as a form of cultural, technological and sustainable growth.

SKILLS

Research Processes & Methods | **Design-Based Research, Literature Review, Online Survey, Focus Group, Observation and Field Note, Coding, Statistics and Data Visualization.**

Design Processes & Teaching | **Design Thinking (IDEO), Information Architecture, Wireframing, Prototyping, User Research and Testing, Teaching, Instructional Design.**

Learning/Content Management Systems | **Canvas, Webflow, Wordpress, Wix.**

Computer & Web Applications | **Adobe Suite, Microsoft Office, Google Applications, Qualtrics, SPSS, R Studio, MaxQDA.**

Speaking & Writing Languages | **Portuguese, English, Spanish, HTML, CSS.**