The Influence of Interior Design on High School Students' Well-being and Stress Perceptions: A Case Study of The Math Guru Tutoring Studio

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ABSTRACT

The Influence of Interior Design on High School Students' Well-being and Stress Perceptions: A Case Study of The Math Guru Tutoring Studio

Sara Marks

This qualitative case study draws upon personal narratives and academic insights from education, psychology, and interior design, offering a comprehensive exploration of the lived experiences of three high school students at The Math Guru tutoring studio, with a focus on how students perceive the studio's distinct interior design in relation to their experiences of school-related stress and learning. Central to this inquiry is a thematic analysis that considers the founder of The Math Guru's interior design intentions and how these design choices resonate with students' perceptions of well-being. The study employs a triangulation approach, with in- depth, semi-structured interviews complemented by on-site photography and observations. The findings illustrate how The Math Guru's interior design, characterized by its aesthetic appeal, comfortable furniture selection, and adaptable spatial dynamics, contributes to students feeling less stressed, more engaged, and generally happier than in their standard school settings. By offering a detailed description of the role of interior design in shaping students' perceptions and experiences of well-being and learning, this research presents The Math Guru's homelike design strategy as an inspirational model for future learning environment design. This study aims to act as a catalyst, encouraging secondary education institutions, along with the educators, designers, and policymakers who shape them, to recognize interior design as a valuable approach to enhancing student well-being, particularly in the context of school-related stress.

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Introduction

Contemporary educational research acknowledges the significant impact of the physical environment on students' attitudes, emotions, and overall well-being (Hughes et al., 2019; Maich et al., 2018; Willis et al., 2019). Despite a growing focus on factors such as classroom lighting and school architecture, the role of interior design in high school learning environments is often overlooked. In today's high school settings, characterized by increasing rates of school-related stress and anxiety, designing an academic haven – a home-away-from-home – emerges as a potential strategy for enhancing student well-being and improving learning experiences (Fathiyah, 2022; Fernández-Sogorb et al., 2021).

Exploring the intricate interplay between physical environments and human emotions, cognition, and behaviour, a compelling body of literature reveals the profound impact our surroundings have on us, with numerous studies illuminating how the interior spaces we inhabit can significantly influence our mental well-being, stress levels, and capacity to cope with challenges (Barrett & Barrett, 2010; Boyce & Ellis, 2005; Fleury-Bahi et al., 2017; Gifford et al., 2011; Ulrich, 1991). In the realm of child and youth studies, learning environments emerge as a prominent source of stress (Fernández-Sogorb et al., 2021; Kouzma & Kennedy, 2004). The prevalence of school-related stress extends across all levels of education, exerting far-reaching repercussions on learning engagement, academic performance, and the well-being of students (Fathiyah, 2022; Pekrun et al., 2011). Thus, when considering young people, who spend a substantial portion of their time within educational institutions, the design of inviting, appealing, and comfortable learning environments may be a potentially critical area of focus.

Interior design is the art and science of developing functional, aesthetically pleasing, and comfortable indoor spaces (National Council for Interior Design Qualification [NCIDQ], 2004).

Most generally, this involves the careful planning of available spaces and strategic placement of both decorative and practical features (NCIDQ, 2004). Of particular interest to this study is the intersection of research in psychology and design, where experts emphasize the pivotal role of interior design in promoting mental and emotional well-being and pinpoint specific design elements that contribute to stress reduction and emotional restoration (Graham et al., 2015; Smith, 1994). Reflecting on interior design in 1969, Neil Postman (as cited in Apps & MacDonald, 2012) commented, "The environment itself conveys the critical and dominant messages by controlling the perceptions and attitudes of those who participate in it" (p. 49). Recent research builds upon this notion by investigating the psychological benefits of interior design in residential and healthcare settings; nevertheless, there remains a noticeable gap in the literature concerning the influence of interior design on students' perceptions of stress in educational contexts (DuBose et al., 2004; Fleury-Bahi et al., 2017; Schreuder et al., 2016). To address this gap, the present study aims to explore how thoughtfully designed learning environments, exemplified by the interior design of The Math Guru tutoring studio, might alter high school students' perceptions and experiences of well-being and foster a more positive and relaxed learning environment.

The Present Study

Considering the unprecedented rise in school-related stress among high school students following the COVID-19 pandemic, the present study emphasizes the significance of the physical learning environment in complementing conventional school-based stress reduction strategies (Racine et al., 2020; Rao & Rao, 2021). Despite the abundance of research on the prevalence and impacts of school-related stress and the ever-growing focus on the influence of the physical learning environment on student well-being, there remains a discernible disconnect

between these two critical concepts in the existing literature (Anniko et al., 2018; Bandyopadhyay & George, 2020; DuBose et al., 2004; Nieves-Whitmore, 2021). As such, the present case study, centred around The Math Guru tutoring studio, offers a unique and potentially valuable opportunity for exploration into this area.

The central objective of this research is to provide a comprehensive understanding and detailed depiction of how The Math Guru's deviation from conventional interior design fosters a learning environment that is both academically and psychologically supportive. Ideally, inspiring educators, designers, and policymakers to contemplate and embrace more creative approaches to learning environment design across educational contexts (Hughes et al., 2019; Maich et al., 2018; Willis et al., 2019).

Conceptual Framework

The aims of this study are framed around the concepts of environmental psychology, attention restoration theory, and the Reggio Emilia 'third teacher' approach (Gifford et al., 2011; Kaplan, 1995; Miller, 2019). Taken together, these well-established concepts provide credibility for the development of an investigation centred around interior design in the learning environment and its potential impact on school-related stress perceptions.

Environmental Psychology

Environmental psychology is an interdisciplinary field of study that emerged in the 1960s and 1970s, focused on how individuals respond to and are impacted by their surroundings (Fleury-Bahi et al., 2017; Gifford et al., 2011; Ulrich, 1991). Studies in the field of environmental psychology examine how various physical factors, such as spatial layout, colour schemes, and temperature, influence psychological and physiological states (Boyce & Ellis, 2005; Gifford et al., 2011). Considering the present study, environmental psychology serves as

an essential framework for investigating how interior design within the learning environment may influence student stress and learning experiences.

Attention Restoration Theory

Cognitive restoration, a key element in enhancing overall well-being, involves a range of psychological processes aimed at ridding the mind of harmful and counterproductive thoughts, such that regaining focus and calmness becomes possible (Kaplan, 1995). Grounded in attention restoration theory, environments are considered restorative when they promote psychological detachment from daily stressors, offer a supportive setting and resources, and enable a person to pay effortless attention to their surroundings (Kaplan, 1995). Intriguingly, the concept of 'favourite places' has been linked to the principles of attention restoration theory (Korpela et al., 2001). An early study by Korpela (1992) into young people's favourite places revealed that these locations were valued for their aesthetic appeal and stress-relieving qualities. When combined with more recent research, Korpela et al. (2001) suggest that a favourite place functions as an environmental facilitator of emotional regulation, offering restorative experiences crucial for positive well-being. This study, drawing from the foundational ideas of attention restoration theory and insights regarding 'favourite places,' aims to explore how specific design elements in The Math Guru learning environment might evoke similar positive responses in students.

The Reggio Emilia 'Third Teacher' Approach

According to the Reggio Emilia approach to education, children and adolescents have the opportunity to learn from three distinct 'teachers': their educators, their peers, and the physical environment itself (Strong-Wilson & Ellis, 2007). Within this framework, the physical learning environment, referred to as the 'third teacher' in Reggio Emilia schools in Italy, is acknowledged for its potential to significantly enhance student learning and overall well-being (Miller, 2019).

Notably, Strong-Wilson and Ellis (2007) believe that the concept of the third teacher has "reconceptualized space as a key source of education provocation and insight" (p. 40). Consequently, the 'third teacher' approach can be seamlessly integrated into the objectives of this study, offering a valuable framework for a deeper understanding of how educators can actively contribute to the design of learning environments that foster positive well-being experiences and perceptions among students (Martin, 2002).

Background of the Researcher

As a master's student in Child Studies with professional experience in various educational contexts, I am deeply interested in addressing the stress that students encounter in their learning environments. This research is not only a professional pursuit but also a personal one. Having personally navigated through the challenges of school-related stress, I have an intimate understanding of the discomfort and unease that can manifest within unwelcoming and institutional classroom settings. This personal struggle, combined with my passion for aesthetics and interior design, has led me to advocate for a more thoughtful approach to the design of learning environments. Central to my research is the belief that thoughtfully designed learning environments can not only inspire and engage students, but also provide substantial support to those struggling with school-related stress.

When contemplating my desire to study the interior design of learning environments, consideration was given to the high school academic settings to which I was personally exposed. In doing so, I often returned to my experiences at The Math Guru tutoring studio and the influence of its founder, Vanessa Vakharia. While my introduction to The Math Guru was as a client in my 2014-2015 school year, as a long-standing source of inspiration for me in the field of inclusive education, my relationship with Vanessa quickly transcended into one centred around

professional development and direction. Recognizing Vanessa's sheer commitment to reducing academic stress and promoting a nurturing learning environment through intentional interior design, The Math Guru studio was deemed an ideal setting for this case study (Simons, 2009).

Notably, due to the existing relationship between the researcher and the research site, specific attention was paid to acknowledging and addressing researcher positionality throughout this study (Creswell, 2007; Mercer, 2007). Practices such as member checking and reflective journaling were used throughout the research process, particularly during processes of data collection and interpretation (Ortlipp, 2008; Patton, 2002; Simons, 2009). These efforts are discussed in further detail in the methods section of the present study.

Literature Review

The Prevalence and Impacts of High School-Related Stress

From early childhood through adolescence, learning is regarded as one of the most critical components of development. As such, experiences of stress within school-related settings can have profoundly adverse effects (Anniko et al., 2018). While some students may find the demands of school and related assessment requirements motivating, for others, these same expectations can quickly accumulate, resulting in experiences of heightened stress and anxiety (Chamberlain et al., 2011; Owens et al., 2014).

A survey conducted by the Institut de la Statistique de Québec (2018) brings attention to the alarming rates of school-related stress, highlighting a significant increase in stress levels among high school students, with 29% reporting high levels of psychological distress during the 2016-2017 school year, as compared to the 21% reported in the initial 2011 study. Additional studies add to these findings, identifying mandatory attendance and the completion of school-

related tasks as the most often cited causes of stress in children and young people (Anniko et al., 2018; Fernández-Sogorb et al., 2012).

In 2020, the COVID-19 pandemic brought about unprecedented challenges, notably impacting the mental health of adolescents. Studies reveal a significant rise in stress and anxiety among young people during this time, with Ellis et al. (2020) reporting that 43% of young Canadians experienced high stress due to the pandemic, particularly concerning its effect on their academics. This increase in stress is consistent across research findings, suggesting that public health measures and the subsequent shifts in adolescents' routines have intensified mental health concerns (Racine et al., 2020; Rao & Rao, 2021). Systematic reviews further support these findings, indicating a detrimental impact of school closures on students' mental health (Best et al., 2020; Ellis et al., 2020).

Significantly, research demonstrates that stress-related emotions, such as worry and dread, have the potential to hinder cognitive functioning in students and impede learning ability (Pekrun et al., 2011; Valiente et al., 2012). Moreover, severe stress impairs executive functioning, compromises working memory, and reduces the ability to sustain focused attention, placing students experiencing elevated stress at a heightened vulnerability to encountering academic difficulties and setbacks in comparison to their less-stressed peers (Cassady, 2004; Owens et al., 2014). This vulnerability often translates into lower academic performance outcomes, increased absenteeism, and an elevated risk of dropping out entirely (Lereya et al., 2019; Pekrun et al., 2011).

Taken together, these insights collectively emphasize the increasing importance of investigating and addressing experiences of school-related stress encountered by students. Within the context of the present study, these findings point to the potential benefit of exploring

learning environments intentionally designed to foster both learning and stress reduction (Nieves-Whitmore, 2021).

The Influence of Learning Environment Design on Student Experiences

Classroom architecture and interior design have evolved considerably over the last several decades – moving away from conventional, teacher-focused spaces to more student-centered and adaptable physical learning environments (Baker, 2012; Chandler, 2009; Donovan et al., 2014). In addition to meeting basic building requirements and regulations, contemporary pedagogical research is increasingly focused on the impact of interior design on academic development and student well-being. These studies explore a wide range of factors, spanning from spatial design and furniture selection to the inclusion of indoor plants and decorative elements (Andrews & Willis, 2019; Barrett et al., 2015; Benade, 2019; Godwin & Kaur, 2021; Hughes et al., 2019).

The Role of Interior Design in Enhancing Academic Development

Emerging research highlights the significant role that physical classroom environments play in shaping academic outcomes. This impact is described to be twofold, starting with the physical standards and structure of the setting and further enhanced by the presence of aesthetic and symbolic elements within the learning environment (Cheryan et al., 2014). Structural components and standards within the environment, such as the layout and quality of furniture, have been closely linked to variations in academic achievement (Baker, 2012; Benade, 2019; Cornell, 2002). Moreover, a comprehensive review of existing literature by Cheryan et al. (2014) reveals the significant role of symbolic features, such as artwork and décor, in fostering student achievement and learning development.

A particularly noteworthy investigation into the effects of classroom design on learning was conducted by Barrett et al. (2015). This seminal study sought to establish if the hypothesized effects of physical classroom design on learning progress could be empirically validated in a real-world educational context. This research focused on the academic progress of 3766 primary school students, in 153 classrooms, across 27 schools in England. The methodology involved a comprehensive survey of both the classrooms and common areas found within each selected school. Following survey completion, researchers assigned ratings to each classroom's design based on features linked to stimulation, individualization, and naturalness (Barrett et al., 2015). Ultimately, the findings of Barrett et al. (2015) underscore that, "There is clear evidence that the physical characteristics of primary schools do impact on pupils' learning progress" (p. 14). This influence was shown to be rather significant, accounting for 16% of the difference in academic progress for students included in this research (Barrett et al., 2015). Despite being based on a younger student sample, the relevance of these findings extends beyond its demographic. Notably, many of the design elements identified as having an influence on students can be easily adopted by educators in practice, including modifications to classroom layout, displays, or wall colours. Echoing findings from research across various age groups, these small and often cost-effective modifications have been shown to significantly influence both academic achievement and learning development (Apps & MacDonald, 2012; Barrett et al., 2015).

The Role of Interior Design in Student Well-Being

Academic achievement was once believed to be the most paramount component of the schooling experience, and while there is little speculation over the significance of learning progress and performance, researchers and educators are increasingly focused on students' emotional and mental well-being (Simmons et al., 2014; Willis et al., 2019). The concept of

well-being, although lacking a universally standardized definition, is commonly understood as a holistic construct made up of interrelated capacities that influence a student's overall quality of life (Thorburn, 2015). Accordingly, this review was built on a conceptualization of student well-being related to the "psychological, cognitive, social, and physical functioning and capabilities that students need to live a happy and fulfilling life" (OECD, 2017, p. 61).

Despite increasing recognition regarding the significance of academic well-being, with socio-emotional teaching techniques often being the central focus of these efforts, the capacity of the physical learning environment to positively impact students is often overlooked (Arndt, 2012; Lelli, 2019; Miller, 2019). Addressing this gap in research, Hughes et al. (2019) conducted a qualitative case study to explore the relationship between physical learning environments and student well-being in high school settings. Situating itself within the real-world framework of secondary education and the 'Flying Start' learning reform, this study explored the well-being experiences of 33 students transitioning from middle to high school in Australia. Through the collection of a variety of verbal and visual data, including interviews and student drawings, Hughes et al. (2019) discovered that "feeling happy, feeling safe, feeling comfortable and having friends" were the four main components of well-being most often reported by students (p. 112). Intriguingly, Hughes et al. (2019) highlight that a lack of physical appeal in the learning environment had a particularly negative impact on student well-being perceptions, specifically in relation to classrooms described as "uninvitingly dark and characterless" (p. 112).

Trends in Contemporary Learning Environment Design

Standard school classrooms were originally designed to reinforce the notion that the role of the educator was to transfer their knowledge onto students – with rows of desks and chairs, a blackboard at the front of the room, and attention directed only toward the teacher standing

centre stage – this style of learning environment has been considered adequate for generations (Baker, 2012; Burke & Burke-Samide, 2004; Chandler, 2009). Yet, as the field of education continues to evolve, so too does classroom design research and practice (Burke & Burke-Samide, 2004; Chandler, 2009; Donovan et al., 2014). Although the vast majority of interior design efforts remain focused on conventionally academic elements, contemporary research increasingly acknowledges the need for innovative, creatively designed learning environments. These emerging perspectives argue for a shift beyond conventional design elements, advocating for environments that foster more engaging and holistic learning experiences for students (Benade, 2019; Clemes et al., 2016; Donovan et al., 2014; Godwin & Kaur, 2021; Maich et al., 2018).

Décor

The symbolic elements an educator chooses to incorporate into the learning environment, such as decorations and artifacts displayed on walls, bookshelves, and desks, have the power to transform a dull classroom into an engaging and aesthetically pleasing learning environment (Apps & MacDonald, 2012; Fisher et al., 2014). As Weinstein and Woolfolk (1989) stated, "the visual appearance of the classroom can be conceptualized as a nonverbal statement" (p. 384). Recent research demonstrates that young people pay attention to these non-verbal messages; symbolic elements, such as pictures of prominent figures and inspirational posters, can communicate to students whether they will be respected and supported in the learning environment, with implications for educational equity (Cheryan et al., 2014). Most significantly, the use of décor has been associated with improvements in both academic performance and student well-being, indicating that it is more than just a means of adding character or visual appeal to a space (Cheryan et al., 2014; Godwin & Kaur, 2021).

It is important to note that while classroom decoration may benefit student inclusion and academic inspiration, the misuse of décor in classroom design can have a negative effect. This does not imply that decoration should be omitted entirely from classroom design – instead, it should be used purposefully and only after careful consideration (Cheryan et al., 2014; Fisher et al., 2014). Interestingly, Godwin and Kaur's (2021) research suggests that classroom displays and decoration only damage learning when décor is unrelated to curriculum. Significantly, the reported impacts of décor in this study varied greatly between grade levels, suggesting that students in higher grades are better able to focus their attention and, thus, may be less sensitive to the presence of displays and decorations (Godwin & Kaur, 2021). In this regard, Godwin and Kaur's (2021) research suggests it may be considered somewhat paradoxical that our early childhood environments tend to be highly decorated, while standard high school settings often have little to no decoration at all. This contrast highlights the need for a more nuanced and thoughtful approach to interior design in learning environments across all levels of education (Apps & MacDonald, 2012; Fisher et al., 2014).

Colour

The role of colour in design, while often overlooked or misapplied, has considerable influence in the learning environment (Yildirim et al., 2007). The power of colour lies in its ability to shape a student's interpretation of the physical space, eliciting both physiological and psychological responses that subsequently affect concentration and academic performance (Küller et al., 2009; Singh, 2006). It is, however, essential to recognize that there are differing views on the impacts of colour on human emotion and behaviour and that the literature on the effects of colour tends to be contested and inconclusive (Singh, 2006). In research on colour theory, as Singh (2006) articulately explains, "some feel that human responses to colors are

stable, therefore applicable to everyone, whereas others disagree, asserting that responses and preferences to colors vary across culture, gender, and age, among others" (p. 786).

Despite differing views across the literature, more recent research, including studies by Barrett et al. (2015) and Cheryan et al. (2014), share similar findings regarding the use of colour in the learning environment. These studies focus on the specific reactions of students to colour and explore ways to harness these reactions to enhance academic development (Küller et al., 2009). In this context, colour theory suggests that warm tones, including red, orange, and pink, are connected to alertness and stimulation, while cool-toned hues, such as blue, green, and purple, are associated with tranquillity and calm (Yildirim et al., 2007). A key finding from the seminal study by Barrett et al. (2015) suggests that classrooms with light-coloured or white walls, complemented by brightly coloured accent walls, were most strongly associated with enhanced learning outcomes. This study also found that additional colour features in the space, including brightly coloured décor, furniture, and rugs, were further connected to academic success (Barrett et al., 2015).

Indoor Plants

In practice, educators tend to support and promote the use of indoor plants in classrooms, and an increasing body of research suggests that incorporating nature into the learning environment is "helpful for emotional states, attention, mental fatigue, behaviour, and personal health" (Han, 2009, p. 658). Han's (2009) notable quasi-experimental study, for instance, found that in contrast to students in plant-free settings, high school students in classrooms with indoor plants reported a considerably higher sense of comfort, in addition to lower absence and disciplinary records (Han, 2009). Moreover, in a similar quasi-experimental study, the introduction of indoor plants in high school classrooms was also found to positively enhance

student perceptions of the learning environment (Park et al., 2008). In this study, students noted that the presence of plants contributed to a more relaxed and stress-reducing classroom atmosphere (Park et al., 2008). Finally, through the use of a randomized trial involving a junior high school in Norway, Fjeld (2000) further demonstrated the ability of indoor plants to change student perceptions by introducing plants to only half of the classrooms studied. Ultimately, when compared to the control group, students in classes with added indoor plants assessed their learning environments more positively, "including rating the room as more beautiful, brighter, and more comfortable" (Fjeld, 2000, p. 50).

Flexible Spatial Design

Transformations in pedagogical theories and approaches, such as the introduction of student-centred learning, have necessitated modifications in the physical structure of the everyday classroom environment (Donovan et al., 2014; Walden, 2015). Relevantly, one of the most well-known and widely implemented interior design modifications in the field of education has been a shift toward a more flexible learning environment (Cornell, 2002; Kariippanon et al., 2017). Most generally, this entails replacing conventional desks and chairs with an arrangement that offers more variety and adaptability (Kariippanon et al., 2017). For instance, in research by Barrett et al. (2015), breakout spaces, storage systems, and various zones for learning within the classroom served as indicators of classroom design flexibility. This study found that increasing the number of learning zones within the classroom for younger children, while providing a more open environment for older students was associated with academic advancement. In addition, the availability of breakout rooms outside the main classroom was linked to positive learning outcomes across all grades studied (Barrett et al., 2015).

Kariippanon et al.'s (2017) qualitative case study research, investigating the lived experiences of students and educators in recently redesigned primary and secondary schools across Australia, offers particularly valuable insights into the literature on flexible classroom design. By comparing the experiences of students in their original classrooms with flexible redesigns, these researchers specifically explored the associations between flexible classrooms, learning, and well-being. The findings of this study demonstrated that flexible classrooms, with a range of furniture, layouts, and materials, were more beneficial to the physical, social, and emotional well-being of students than their previously 'inflexible' classrooms (Cornell, 2002; Kariippanon et al., 2017). Drawing from these observations and integrating theories of self-determination, Kariippanon et al. (2017) concluded that, when designed purposefully, flexible learning environment design can support enhanced learning engagement and student well-being.

Flexible Furniture

High school students are reported to spend up to 8 hours of their school day sitting down; and while recent curricular modifications have sought to reduce the amount of time young people spend sitting, the argument persists that if students are to be seated for such considerable lengths of time, the choice of furniture in the classroom must be of significant importance and employed with careful preparation (Clemes et al., 2016; Pate et al., 2011). Significantly, research into the neurobiological foundations of learning suggests that students learn most effectively when they are in a state of physical comfort – whether that be sitting at a desk, on a sofa, or even on the floor (Arndt, 2012). In practice, this insight has led to the introduction of flexible classroom seating options, ranging from sofas and bean bag chairs to yoga balls and standing desks (Kariippanon et al., 2017; Umeda & Deitz, 2011). According to Kariippanon et al. (2017), flexible furniture options provide students with increased experiences of autonomy and learning

motivation, while also promoting decreased distractions and discomfort. Importantly, the quality of furniture is also a significant factor; furniture that is uncomfortable, institutional, and aesthetically unappealing may be counterproductive and associated with adverse impacts on learning engagement and motivation (Cornell, 2002).

Relaxation Stations

In light of educators' increased recognition of the socio-emotional well-being of their students, the design of learning environments increasingly features specialized areas dedicated to relaxation and restoration (Hughes et al., 2019; Maich et al., 2018). While the terminology used to describe these spaces varies, the physical characteristics and psychological purposes remain the same. For example, Khare and Mullick (2009) advocate for "withdrawal spaces" to aid in student stress reduction and emotional regulation (p. 50), while Maich et al. (2018) employ the term "relaxation station" to describe the same goals (p. 160). To ensure clarity, this review will henceforth use the term 'relaxation station' to refer to these specific areas.

Originally developed as a trauma-informed intervention, relaxation stations have transformed into thoughtfully designed spaces within the physical learning environment, providing comfort and relief for students experiencing worry or school-related stress (Lantieri, 2008). Relaxation stations are most often praised by educators for their minimal cost, straightforward set-up, and design flexibility; nevertheless, thoughtful consideration must still be given to differentiating the space based on the developmental stages of students and the structure of the physical learning environment (Maich et al., 2018). Relaxation stations should be designed with physically comfortable, soft, and accessible furniture, and may also feature pillows, blankets, and natural décor elements, among other cozy and comforting features (Maich et al., 2018).

Despite increasing efforts among primary school educators to incorporate relaxation stations into their classroom designs, there appears to be a lack of awareness and understanding of the advantages of these spaces beyond early childhood contexts (Maich et al., 2018). High school educators, in particular, often grapple with the implementation of such spaces in their open-concept and institutional classroom settings (Scanlon & Baker, 2012).

The Environmental Competence of Educators

Research conducted in 1974 by Proshansky and Wolfe (as cited in Martin, 2002) discovered a notable disparity in educational practice, where lesson preparation and completion of curriculum were given a disproportionate amount of attention over the design of the learning environment. Regrettably, for the most part, the same holds true in the educational contexts of today (Lelli, 2019; Nieves-Whitmore, 2021; Wilson & Cotgrave, 2016). Despite the ever-growing body of literature emphasizing the value of interior learning environment design, educational institutions tend to overlook these findings in practice (Benade, 2019; Lelli, 2019). In most classrooms, desks and chairs are individually placed in rows, indoor plants are not included, and research findings surrounding student perceptions, particularly concerning aesthetics, are not practically applied (Chandler, 2009; Walden, 2015). Notably, while the functional aspects of the learning environment are often well-planned, the elements that enhance comfort and visual appeal often receive insufficient attention (Burke & Burke-Samide, 2004; Willis et al., 2019). This common occurrence stands in contrast to research that advocates for a more thorough and thoughtful approach to the design of physical learning environments, taking into account the influence of students' perceptions and preferences on their well-being and learning experiences (Burke & Burke-Samide, 2004; Simmons et al., 2014; Gifford et al., 2011).

In an effort to better understand the obstacles to integrating interior design in educational contexts, Martin (2002) explored the degree to which educators actively and purposefully utilized their physical learning environments. This year-long study, involving the observation of 61 in-class lessons and interviews with 39 educators, led to Martin's (2002) classification of three distinct categories of environmental competence. The first group consists of educators who demonstrate a complete lack of environmental competence, appearing entirely unaware of how the physical environment might influence their teaching or students (Martin, 2002). The second group, described by Martin (2002) as having awareness without competence, included educators who are conscious of the influence of the physical environment on their students but are lacking in the knowledge required to effectively redesign their learning environments. Importantly, the final group consisted of educators who were not only aware of the influence of the physical classroom environment, but also actively utilized interior design to enhance their teaching – it is this type of educator that Martin (2002) considered to be environmentally competent – however, findings suggest this level of competence is not as prevalent in practice as one might hope.

The overarching implication of existing research is that until educators view the physical environment as a powerful pedagogical tool, with the potential to positively influence student experiences and outcomes, interior design will likely remain an undirected and underappreciated aspect of everyday education (Cencic, 2017; Lackney, 2008; Martin, 2002).

Psychological Benefits of Interior Design in Residential Settings

Research extending beyond academic contexts indicates that the design of one's home can significantly impact their mental health. Although not commonly referenced in educational research, these studies may offer valuable insights into the potential impact of interior design on student stress experiences (Kearns et al., 2000; Martín López & Fernández Díaz, 2022). Notably,

by identifying the unique characteristics that differentiate the concept of a ‘home’ from merely a space to reside in, studies in the area of environmental psychology reinforce the ability of the home environment to protect and restore our mental health (Graham et al., 2015; Kearns et al., 2000; Smith, 1994). In distinguishing these concepts, Karjalainen (1993, as cited in Kearns et al., 2000) noted, “house is a material object…home is an emotionally based and meaningful relationship between dwellers and the dwelling places” (p. 398). Within one’s residence, the incorporation of appropriate design features, safe and comfortable living conditions, and familiar symbolic elements, are all environmental concepts associated with stress reduction and restoration (Kearns, 2000; Smith, 1994).

The interior design of residential settings, while traditionally overlooked as a conventional stress-reduction strategy, received increased interest in the context of the COVID-19 pandemic (Glynn et al., 2021). Amid the periods of mandatory quarantine, a select number of studies specifically examined the impact of residential interior design on mental health, with some focusing on technical factors, such as temperature and lighting, and others emphasizing the stress-reducing and well-being enhancements of art and nature (Glynn et al., 2021; Martín López & Fernández Díaz, 2022; Xiao et al., 2022). Particularly noteworthy is qualitative research by Martín López and Fernández Díaz (2022). Based on the premise that prolonged exposure to particular interior design elements can elicit positive emotions, this study sought to integrate the notions of quarantine, mental health, and home design. To achieve this, researchers selected 147 interior designers and interior design hobbyists to complete surveys detailing their colour, fabric, and furniture preferences (Martín López & Fernández Díaz, 2022). The results of this study are consistent with existing interior design research in both home and school settings (Kariippanon et al., 2017; Maich et al., 2018; Martín López & Fernández Díaz, 2022; Yildirim et al., 2007).

According to survey responses, among the various design themes investigated, textures, particularly soft fabrics, elicited the most favourable response overall (Martín López & Fernández Díaz, 2022). With respect to colour preferences, blue, grey, white, beige, and brown were most highly regarded, with participants using the words “pleases” and “soothes” to describe them (Martín López & Fernández Díaz, 2022, p. 23). Furthermore, participants highly regarded the furniture in the living room, with couches and armchairs eliciting the most positive emotions (Martín López & Fernández Díaz, 2022). These insights, when considered in combination with the present study, suggest that incorporating elements of residential interior design into high school learning environments may offer a distinct and beneficial approach to enhancing students' perceptions of school-related stress.

Research Questions

Inspired by the insights from the literature review above, the present case study is grounded in three overarching research questions: 1) How do high school students who participate in tutoring sessions at The Math Guru describe their experiences with school-related stress within this uniquely and unconventionally designed learning environment?, 2) Which elements of interior design are specifically recognized by these high school students as having an influence on their school-related stress perceptions and experiences (either positively or negatively), and 3) How might the insights from high school students and the founder of The Math Guru about the studio's interior design contribute to future research and the evolution of learning environment design in practice?

Methods

Research Design

The present study utilizes a qualitative case study methodology to explore the unique interior design of The Math Guru tutoring studio and its potential influence on high school students. Following the insights of Simons (2009), a case study is recognized as a valuable resource for this research, offering a deep and authentic understanding of how students perceive and engage with their learning environments (Creswell, 2007). The selection of the case study methodology is rooted in its ability to provide a thorough and detailed account of how various interior design elements, including colour, furniture selection and arrangement, and overall ambiance, contribute to students' experiences at The Math Guru (Creswell, 2007; Simons, 2009). To accurately and comprehensively depict the essence of The Math Guru's learning environment, this study employs a diverse range of data collection methods. These methods encompass digital photography to visually document the interior design elements, in-depth interviews with both students and the founder of The Math Guru, and supplementary on-site observations carried out within the tutoring studio environment (Creswell, 2007; Simons, 2009).

Case Setting: 'The Math Guru' Tutoring Studio

This case study focuses on 'The Math Guru,' a boutique tutoring studio located in uptown Toronto, chosen for its distinctive and deliberate approach to interior design and high school student clientele, making it an information-rich case setting for this study (Patton, 2002). Founded in 2010 by Vanessa Vakharia with the goal of fostering more positive attitudes towards math and science, The Math Guru (2021) was purposefully designed to be a more welcoming and appealing learning environment for its students. As articulated on the studio's website, The Math Guru (2021) studio resembles that of a "coffee-shop-meets-yoga-studio-meets-your-best-friend's-house" (para. 3). The unique and unconventional physical learning environment at The Math Guru provides a value opportunity to explore how a thoughtful approach to interior design

might influence student well-being and academic mindsets, aligning with the objectives of the present study.

Participants

In accordance with the qualitative approach of this study, purposeful sampling was used to identify participants who could provide informed insights and experiences relevant to the research goals (Patton, 2002). Accordingly, three high school students from The Math Guru, as well as the studio's founder, were selected for their distinct perspectives and applicable understandings.

High School Students from The Math Guru

To obtain student-centred perspectives regarding the influence of interior design on school-related stress, three high school student clients from The Math Guru were also recruited. These students met specific eligibility criteria, including enrollment in grades 9-12 during the Winter 2023 semester, consistent attendance at tutoring sessions at The Math Guru, and a willingness to participate in discussions regarding school-related stress. The recruitment process, facilitated through Vanessa's initial identification of potential participants, involved direct communication between the researcher and interested students to ensure informed participation and compliance with ethical standards, including obtaining necessary parental consent and adolescent assent (see Appendix B and Appendix C). To promote confidentiality, Vanessa was not made aware of the specific students ultimately selected to participate.

This case study is enhanced by the participation of three female grade 12 students from different public schools in uptown and downtown Toronto. These students, who have been consistently attending sessions at The Math Guru for periods of 3-4 years, possess a deep understanding of the studio's interior design and its potential influence. Despite their

demographic similarities, these students are believed to bring a diverse array of perspectives to this research. Their detailed insights offer an in-depth exploration into how The Math Guru's unique learning environment has individually influenced their experiences and perceptions of school-related stress.

The Founder and Designer of The Math Guru

Vanessa Vakharia, the founder of The Math Guru, contributes a rich perspective to this study. As a licensed high school math teacher, experienced educator, public speaker and author, Vanessa has a deep understanding of educational dynamics. Therefore, while the focus of this study is primarily student-centred, Vanessa's dual role as both a former educator and founder/designer of The Math Guru offers valuable insights into the relationship between pedagogical practice and learning environment design.

Notably, Vanessa's existing relationship with the researcher allowed for a greatly streamlined recruitment and consent process (see Appendix A). Following ethical approval, Vanessa promptly provided consent and participated in her interview.

Data Collection

Consistent with Stake's (1995) recommendations for comprehensive data collection in case study research, this study adopted a triangulation approach, integrating multiple methods and sources to thoroughly investigate The Math Guru's unique design. This methodological approach was instrumental in facilitating a rich description of the studio's interior design elements and their impact on students.

Description of the Physical Learning Environment and Digital Photographs

The initial phase of data collection involved the creation of a comprehensive description of The Math Guru's physical learning environment (Stake, 1995). This written description was

then complemented with a series of digital photographs, capturing the studio's various learning zones and specific interior design elements. Echoing Latham's (2004) assertion, these photographs were deemed crucial in conveying “a sense of the feel and texture of a place or moment with a succinctness that words can rarely achieve” (p. 129). Beyond providing a visual representation of The Math Guru learning environment, these photographs were also integral to data analysis and validation purposes (Latham, 2004).

Semi-Structured Interviews

The primary data source in this study was one-on-one semi-structured interviews conducted with the founder of the tutoring studio and each individual high school student participant (Creswell, 2007). To guarantee the accuracy of records and enable effective data analysis, all interviews were audio-recorded and transcribed (Creswell, 2007).

High School Student Interviews. Each student participant engaged in a 30-minute, one-on-one semi-structured interview (Creswell, 2007). These interviews, while informal in nature, followed a pre-written student interview guide aligned with the study's objectives (see Appendix D). The interviews delved into students' experiences of school-related stress, their perceptions of The Math Guru’s interior design, and their comparative experiences within The Math Guru and their standard school classrooms. Key topics included their stress and coping experiences, initial impressions of The Math Guru’s design, and suggestions for redesigning standard school classrooms.

Founder and Designer Interview. A separate 60-minute interview was conducted with Vanessa Vakharia, the founder of The Math Guru, to obtain deeper insights into the relationship between learning environment design and student stress. A pre-written interview guide facilitated a detailed discussion surrounding Vanessa’s interior design intentions, her observations of

student experiences within The Math Guru, and her specific perspectives on the relationship between the studio's interior design and student stress (see Appendix E).

On-Site Observations

To complement and contextualize interview data, on-site observations at The Math Guru were conducted and documented through detailed field notes (Stake, 1995). Conducted over three separate days across a six-month period, these observations contributed to a more comprehensive and valid portrayal of The Math Guru's learning environment (Stake, 1995).

Data Analysis

In this case study thematic analysis was the primary method of interpreting data collected through semi-structured interviews (Creswell, 2007). Following the guidelines laid out by Creswell (2007) and Stake (1995), this analytical approach provided an in-depth exploration of participant perspectives, emphasizing high school students' experiences of school-related stress and the potential influence of specific interior design elements on their well-being and learning perceptions, both within The Math Guru and their standard school settings.

The initial phase of thematic analysis involved detailed coding of interview transcripts, with each individual quote being carefully reviewed and assigned a precise code. These codes were then grouped into broader categories related to the study's key focus on school-related stress and the role of interior design, forming the foundation for emerging themes. As themes emerged, they were continually refined based on relevant connections and patterns. Each theme was then defined and supported with direct quotes from interviews, facilitating a nuanced and insightful discussion of the study's findings (Creswell, 2007; Stake, 1995).

Establishing Credibility

Recognizing the inherent limitations of qualitative research, this case study employed specific strategies to strengthen its credibility. To address researcher subjectivity, member-checking techniques were employed, involving ongoing engagement with participants throughout the interview process to ensure that emerging patterns accurately reflected their lived experiences (Creswell & Miller, 2000). Additionally, acknowledging the significance of researcher positionality, the researcher engaged in extensive field note-taking and reflective journaling (Cruz, 2015). This process was aimed at maintaining a transparent record of the researcher's evolving thoughts, experiences, and potential biases, particularly concerning their pre-existing relationship with the case setting (Ortlipp, 2008).

Ethical Considerations

To ensure the protection of all participants, attention was given to satisfying all requirements set forth by the Concordia University Human Research Ethics Committee (UHREC). This included acquiring the UHREC Certificate of Ethical Acceptability and implementing a process of informed consent. All participants invited to take part in the study were informed verbally and in writing of the study's objectives, planned data collection, analysis, and storage procedures (Simons, 2009). Moreover, all participants were informed of their right to withdraw from the study at any time (Simons, 2009).

Notably, while consent was granted for the use of 'The Math Guru' and its founder, Vanessa Vakharia's real names, additional measures were implemented to ensure the privacy and confidentiality of all student participants by employing numerical codes, such as 'Student 1 and 'Student 2', from the onset of data collection through to the final write- up (Simons, 2009)

Findings

Through an exploration of The Math Guru's unique approach to interior design, the findings of this case study illuminate the potential role that thoughtful and creative learning environment design can play in shaping high school students' school-related stress perceptions..

Comprehensive Description of The Math Guru's Physical Learning Environment

The Math Guru tutoring studio is divided into three distinct areas, each with its own unique design and function: 1) the main studio, 2) the study lounge, and 3) the private tutoring rooms. Detailed descriptions of each of these areas are provided in the following sections.

Entrance and Front Hallway

The entrance to The Math Guru is distinct, with a door featuring a framed number '2', a framed calculator, and a sign in pastel mint green with golden lettering that reads "Quiet Study Area" (see Figure 1).

Figure 1

Entrance to The Math Guru Studio

Upon entering The Math Guru, students encounter a hallway adorned with wall art. One wall is dedicated to a gallery-style display of framed calculators, while the opposite wall exhibits a series of framed inspirational quotes (see Figure 2). At the end of the hallway are two

distinctively decorated tables, the first of which features a "Welcome to The Math Guru" lightbox sign, a stained-glass lamp, and an assortment of plants, as well as an affirmation board hung above with the phrase 'Chill Hard, Study Harder' written on it (see Figure 3). The second table displays a collection of eclectic objects including a vintage jewelry box, gold mirror, incense, and framed art prints (see Figure 3).

Figure 2

Calculator Gallery and Inspirational Quotes in Front Hallway

Figure 3

Entry Table Displays in the Main Studio Entrance

The Main Studio

Extending from the front hallway, The Math Guru's main studio features a spacious open-concept layout defined by its multifunctional design. The main studio is painted in a pastel colour scheme, with one wall featuring a geometric design and the other one painted in an off-white tone, a portion of which serves as a whiteboard wall (see Figure 4). The studio is divided into two sections, a casual seating area and a central tutoring zone, with the flooring shifting from hardwood to a patterned rug to help separate these two spaces (see Figure 4).

Figure 4

The Layout of the Main Studio

In the casual seating area, two vintage-style velvet pink couches adorned with throw pillows create a welcoming L-shaped arrangement around a wooden coffee table holding various puzzles, chess boards, and games (see Figure 5).

Figure 5

Pink Velvet Couches in the Main Studio

Adjacent to this informal seating arrangement is the central tutoring section, featuring large, off-white tables surrounded by eclectic wooden chairs. This area is enhanced by a vibrant stained-glass window, white shelves with decorative items, and a piano embellished with indoor plants (see Figure 6).

Figure 6

Central Tutoring Section of the Main Studio

Storage solutions within the main studio are both functional and visually appealing. On one side, a row of shelves displays an assortment of tea-filled tins, with mugs hanging from hooks underneath (see Figure 7). On the opposite wall, a wooden cabinet is neatly organized

with educational supplies, ranging from markers to math-themed stickers (see Figure 8). A third shelving unit displays a curated selection of math-**themed artifacts**, books, and merchandise, as well as decorative elements like globes and candles (see Figure 8).

Figure 7

The 'Tea Wall' in the Main Studio

Figure 8

Supply Cabinet and Decorative Shelving Display in the Main Studio

The Study Lounge

The 'Study Lounge' area of The Math Guru functions as both an extension of the main studio area and a dedicated space for informal individual or group studying. At the front of the study lounge sits a vintage olive-green couch, adorned with blue and green cushions, set against

a cream-coloured wall embellished with a pink and yellow geometric decal (see Figure 9). In front of the couch is a wooden coffee table, much like in the seating area found in the main studio space (see Figure 9).

Figure 9

Olive Green Couch in the Study Lounge

To the right of the couch is a decorative white vanity table and a matching wicker shelving unit. These pieces display an array of items, including a framed periodic table of elements, a collection of crystals, and various coloured vases and greenery (see Figure 10).

Figure 10

Matching Vanity and Decorative Wicker Shelves in the Study Lounge

To the left of the green couch, the study lounge expands into an open-concept design, characterized by three white walls and one navy blue accent wall (see Figure 11). This section is furnished with three large white tables, each with matching white wooden dining chairs, creating multiple spaces for individual study or group work (see Figure 11).

Figure 11

Open Concept Layout in the Study Lounge

In a continuation of the lounge's decorative theme, a second small white wicker shelving unit adorned with plants and colourful vases is positioned beside the white tables on the right side of the lounge (see Figure 12). Beside this shelving unit a large, framed whiteboard is mounted on the wall (see Figure 12). On the opposite side, against the blue accent wall, stands a vibrant yellow hutch storage cabinet, displaying an array of colourful glass vases and potted plants (see Figure 13). Adjacent to the hutch, a series of woven circular decorations in various sizes adorn the wall above the third white table (see Figure 13).

Figure 12

Framed Whiteboard and Decorative Wicker Shelves in the Study Lounge

Figure 13

Yellow Hutch and Wicker Wall Decorations in the Study Lounge

At the far end of the lounge, wicker armchairs with plush magenta cushions offer a more casual seating option (see Figure 14). These chairs are positioned against a wall of windows with light coral curtains and are accompanied by a small table with an indoor plant and two small vases (see Figure 14). A white floor lamp and a third small white wicker shelving unit, filled with additional greenery and decorative items, complete this area (see Figure 14).

Figure 14

Armchairs and Decorative Wicker Shelves in the Study Lounge

Private Tutoring Rooms

The Math Guru also has several private tutoring rooms, accessible from both the main studio and the study lounge. While each room exhibits its own unique aesthetic, they all adhere to a consistent setup that reflects The Math Guru's overall design approach. As shown in Figure 15, the typical setup in these rooms includes a table with a mix of dining and office chairs, a framed whiteboard, and an informal seating option such as an armchair.

Figure 15

Three Variations of the Typical Private Tutoring Room Set-Up

In order to capture the essence of these individual learning environments, one room adjacent to the study lounge, as shown in Figure 16, has been selected to serve as a

representative example of these private tutoring spaces. Central to this room is a large white table complemented by three chairs upholstered in orange velvet fabric, alongside a classic dining chair (see Figure 16). One side of the room features a narrow table adorned with colourful glass vases containing fresh greenery and dried florals, with a white wicker art piece hanging above (see Figure 16). On the opposite wall is a large, framed whiteboard, mirroring the set-ups found in the main studio and study lounge (see Figure 16). The room is completed with a green armchair, a cream-shaded floor lamp, and a small wooden coffee table with a potted plant, all against a wall of windows (see Figure 16).

Figure 16

Exemplary Private Tutoring Room

Findings from the Founder and Designer of The Math Guru

This section presents the findings from an in-depth interview with Vanessa Vakharia, the founder of The Math Guru. Thematic analysis revealed three key themes that emerged from the interview, providing valuable insights into Vanessa's pedagogical philosophy, her holistic approach to education, and the unique design of The Math Guru learning environment. Collectively, these themes provide a comprehensive understanding of Vanessa's strategic interior design approach, aimed at positively influencing students' well-being and learning experiences, particularly in relation to school-related stress.

Theme 1: The Establishment and Educational Philosophy of The Math Guru Tutoring Studio

This theme explores Vanessa's professional journey as an educator, from her early experiences as a tutor to the establishment of The Math Guru. It delves into her appreciation for informal learning environments, the challenges she faced in conventional public education settings, and her desire to create an authentic and personalized learning atmosphere at The Math Guru.

Appreciating Informal Learning Environments. Vanessa's reflections on her initial experiences as a tutor highlighted her profound appreciation for unconventional learning environments, particularly coffee shops. She fondly reminisced about these informal settings:

> I ended up like tutoring all the kids in my class, and we would go to like the local coffee shop and you could, at the time, smoke inside, and we would literally sit there for five hours every night just doing homework. Like it was super fun.

Vanessa explained how these experiences reshaped her idea of what a learning environment can be, sharing, "It turned it from something that like you only learn in quiet environments where

you have to like not be yourself – to like no! be yourself! smoke your cig, have your coffee, be with your friends, but also learn."

Confronting Institutional Limitations in Public Education Settings. Vanessa's transition into a traditional teaching role revealed a stark contrast between her informal experiences and the rigid structure of the public education system. She described this phase of her career as a period marked by an ongoing struggle to adapt her dynamic teaching approach to the inflexible institutional norms and specific hurdles of the public-school where she worked:

> It was like a complete shit show. Like…that exact type of school building, where there's so much red tape, and like, you have to watch out, but also, like, the school environment is so not conducive to learning…There were too many structures in place, the environment was gross. And like I tried to do my best, but like…a school environment like that doesn't account for different learning styles or anything like that.

Designing The Math Guru as an Authentic Learning Environment. Vanessa founded The Math Guru with the intention of creating a unique learning environment, distinct from the impersonal nature of standard school settings. She expressed her desire to design a space that was reflective of her personal style: “I always wanted it to be really authentic, because schools are so inauthentic... Whereas I'm the teacher here, this is my studio, I wanted it to reflect my personality.” Vanessa specifically emphasized the "study lounge" in her studio as a manifestation of this philosophy, describing it as a collaborative, "boho chic" styled area that mirrors both her personality and teaching methods (see Figure 9). Vanessa's commitment to personalization, however, was not established without its challenges, as she recounted feedback from parents who initially misinterpreted the studio's interior design as catering exclusively to female students,

emphasizing, "I did tutor mostly girls at first, but it's designed after my own style. There's no gender assigned to it.”

Theme 2: Balancing Academic Achievement and Student Well-being

This theme addresses Vanessa's holistic approach to education at The Math Guru, with a particular emphasis on student well-being. It encompasses her observations of school-related stress, strategies for integrating well-being with academic success, and efforts to create a more comfortable and supportive learning environment.

Recognizing and Responding to School-Related Stress. Drawing from her interactions with students at The Math Guru, Vanessa highlighted the persistent stress and anxiety she observes among high school students: "I actually think students have always been really stressed about school, like always. Like, they'll tell me about how everyone's crying before an exam, or they got a bad test grade." She also noted evolving perceptions surrounding school-related stress, stating, "I think like 10 years ago, it was a joke to be like, I have math anxiety, or like, anxiety is affecting my performance, whereas now it's very well recognized that anxiety will directly impact your performance in school.”

Addressing School-Related Stress at The Math Guru. Vanessa's approach to addressing school-related stress among students at The Math Guru is proactive, as she explained, "We just assume now that every student is anxious, and every student has like, school-related anxiety. So, I think it helps us be like more cognizant of it." Vanessa described this holistic method as blending academic instruction with a commitment to nurturing students’ well-being, emphasizing the connection between mental states and learning ability:

> My approach from the beginning has been like, I’m not just tackling math content, I’m tackling mindset…If you just think about it, like if you’re super stressed about something you

> can’t function, right, like you, if you’re in fight or flight mode, you’re not going to be like, let me solve this quadratic equation.

Vanessa also highlighted her commitment to making The Math Guru a comfortable learning environment for students facing stress, adding, "What better a stage to be in than comfort to actually then go learn something you're already stressed about?"

Theme 3: Intentional Interior Design and its Observed Influence

This theme explores Vanessa's intentional approach to the interior design of The Math Guru tutoring studio, exploring how her design choices reflect her pedagogical beliefs and contribute to a learning environment that aims to be more inviting and engaging than standard school settings.

Designing an Informal and Comfortable Learning Environment. Vanessa discussed her observations of anxiety and apprehension among new students at The Math Guru, attributing these feelings to their negative preconceptions about learning environments:

> Like students will often say, especially new students, I was really nervous to come to tutoring, because like…there is a stereotype that it's just going to be some disgusting studio, or it's going to just be your school again! Like, it's going to be this stuffy place. And most tutoring centres are like that.

She described The Math Guru’s interior design as a conscious effort to positively transform students' perceptions, stating, "Most teenagers have never been in a space like this, so like...it allows them to build a whole new identity around learning." Vanessa described her interior design approach as drawing inspiration from environments she considers to be relaxing, such as her own home, yoga studios, and coffee shops, along with the integration of specifically soothing elements such as "incense” and "crystals" (see Figure 3 and Figure 10). She explained these

strategies, along with practices like offering students a cup of tea during their sessions, as part of her effort to create a calming atmosphere at The Math Guru.

Designing a Sensory Engaging and Visually Appealing Learning Environment. Vanessa emphasized her sensory-focused approach to the interior design of The Math Guru, stating, "It's like a holistic view of education and holistic means that like, all of our senses are engaged." She attributed this approach to her personal mindfulness practices and belief in the stress-reducing benefits of sensory engagement:

> If I'm ever really stressed at home the first thing I need to do is like... I need to be looking at a clean space, I need to be looking at something pleasing. I need things to smell good. And like that relaxes me so much. So, I know that it has that effect.

Vanessa elaborated on her sensory engaging design efforts within The Math Guru, referencing soft fabrics, pops of colour, and unique auditory experiences such as "Taylor Swift power hour" on Tuesdays – all aimed at fostering a calming and stimulating learning environment.

Designing a Collaborative and Social Learning Environment. Vanessa highlighted her commitment to fostering a collaborative learning environment at The Math Guru, rooted in her belief that "learning is communal." She explained how this principle shaped the studio's layout, opting for group tables and couches arranged openly instead of traditional desks and chairs (see Figure 6 and Figure 11). Vanessa also discussed the importance of spatial dynamics in enhancing learning engagement, drawing from her own observations of student interactions:

> I think seeing how students use the space was the first impetus for being like, oh, we should get different tables, or we can like, you know, move things around…Like how do we maximize the space to accommodate more students without causing distractions?

Vanessa also compared the studio's environment to a coffee shop, noting its positive impact on student engagement: "Like imagine a coffee shop where everyone's sort of talking, but like you're doing your own thing, and you feel like you're in this collective social environment, even though you're doing work."

Designing an Interactive and Evidence-Based Learning Environment. Beyond her own observations, Vanessa also discussed integrating contemporary educational research into The Math Guru's design. She described being particularly inspired by "Building Thinking Classrooms" by Peter Liljedahl, referring to it as "the biggest book in education right now," and highlighting its influence on her incorporation of "framed whiteboards at each table" (see Figure 13 and Figure 16). Reflecting on this addition of whiteboards throughout the studio, Vanessa shared, "It's incredible to watch how many students will get really excited to do a math question if they can just get up and do it on the board...Like it creates this whole other layer." She also noted that whiteboards encourage students to embrace mistakes as part of learning, explaining, "Because what can you do with a whiteboard? You can just like, erase it so quickly."

Findings from High School Students at The Math Guru

This section outlines the findings obtained from interviews with three high school students, focusing on their personal perceptions and experiences within the physical learning environment of The Math Guru tutoring studio. Through thematic analysis, four distinct themes have emerged, highlighting a stark contrast between students' perceptions of their standard school settings and those of The Math Guru. These themes incorporate various factors related to students' experiences in these different learning environments, ranging from their strategies for coping with school-related stress to their interior design preferences.

Theme 1: Student Experiences of School-Related Stress and Coping across Learning Environments

This theme explores the ways in which students navigate school-related stress, with a particular focus on the increasing academic pressure they face as they advance through grades and the range of strategies they use to cope. It also compares students' perceptions of stress in their standard school settings with their notably less stressful experiences at The Math Guru.

Stressors in Educational Settings. All three students reported experiencing school-related stress, particularly regarding assessments and future academic plans. Student 1 indicated, "Most of my stress comes from like, evaluations and like, assessments and that kind of thing." This student also highlighted the significance of having alternative testing environments specified in their Individualized Education Plan (IEP) to minimize stress and distractions during tests or exams. The impact of classroom settings on stress levels was also noted by Student 3, who commented, "I feel like certain classrooms are more stressful and like, and then some that are less stressful." Notably, school-related stress was described to escalate with advancing grades. Student 2 shared, "I feel like stress about school has definitely gone up since like, I've been in the higher grades," while Student 3 similarly added, "I think now it's a lot more stressful considering it's grade 12."

Coping Strategies in Conventional School Settings. Students shared a range of strategies for managing stress within their standard school settings. Student 1 explained their method of taking short breaks outside the classroom: "I usually go for a walk...Sometimes I'll go like an extra couple laps around just to like, collect myself, decompress a little." While Student 3 underscored the relief they find engaging in informal, non-academic conversations, underscoring their appreciation for casual, social spaces:

> Where I eat lunch and stuff, like I'm never stressed out there…It's just like at the end of one of the hallways where all my friends eat lunch and it's like, I think that like relieves my stress because you can like talk about things that are not school related.

In contrast, Student 2 expressed a resigned attitude, remarking, "I kind of just deal with it. Like there's nothing much I can do, I guess." This student highlighted their preference for addressing stress outside of school and suggested the need for designated relaxation areas within the school itself, envisioning "a spot in the school where like people could just relax and chill instead of freaking out." Similarly, Student 3 noted an absence of calm study areas within their school, mentioning, “We don’t really have anywhere that is like a quiet place to work…There is the library and stuff, but there is always like presentations going on in there."

The Math Guru as a Stress-Free Learning Environment. All three students described The Math Guru as a significantly less stressful learning environment in comparison to their standard school settings. Student 1 and Student 3 both described their learning experiences at The Math Guru as completely free of stress, with Student 1 emphasizing this absence of pressure even in challenging situations: "I don't think I've ever been stressed at that place ever. Even if I have like a test the next day.” Similarly, Student 3 shared, "I don't think I've ever been stressed out at The Math Guru. I think it's really helpful. I've always liked it there.” Furthermore, Student 2 noted, “I’m definitely less stressed when I’m at The Math Guru."

Theme 2: Student Preferences for Visually Engaging and Appealing Learning Environments

This theme outlines students' perceptions of their standard school settings compared to their experiences at The Math Guru, focusing on the influence of specific aesthetic elements on their well-being and learning experiences. Furthermore, it details students’ dissatisfaction with the uniformity and institutionalized nature of their standard school settings in contrast to their

appreciation for the visually appealing and colourful interior design of The Math Guru. Moreover, it underscores students' specific desire for the inclusion of indoor plants within their learning environments.

Desire for Enhanced Aesthetic Appeal. The students consistently described their standard school classrooms as uninspiring and institutional. Student 2 conveyed their disappointment with their school's design, remarking, "Everything is really just bland. Like white walls, blue chairs, grey desks, there's nothing like very special about it." Student 3 echoed this sentiment, noting their classroom's isolated layout and lack of engaging elements: "All the desks are like separate, like each desk on their own. It's pretty like dull. The walls are normally just white. And then that's it."

Conversely, The Math Guru was continually praised by students for its engaging and visually appealing learning environment. Student 2 emphasized the warm and welcoming atmosphere of the studio, drawing a sharp contrast to their standard school setting: "It's just the entire aura of it. Like there's just so many differences like, the design of The Math Guru, like, I feel like you feel like you're not like, in this like cold, dark classroom." This perspective was reinforced by Student 3, who described The Math Guru's learning environment as notably more inviting than other tutoring centers they had attended:

> Other places I've been to, they are kind of a lot more, I don't know, like scary, and like more dull. But The Math Guru just looks like it should not be a tutoring place…I feel like it's a more like happy vibe.

Student 1 shared a similar experience, specifically noting their initial fascination with The Math Guru's distinctive furnishings: "I remember I went, and I just like, like there's pink couches. And

like, they have tea on the wall. And like, it's just like, it smells nice… and I think that was like my first impression" (see Figures 5 and 7).

Colour Preferences. The colourful and vibrant ambiance of The Math Guru was described by students to positively enhance their overall learning experience. Student 3 conveyed this influence, expressing, "I feel like it's just nicer to be in a space that's not like super ugly... It just feels like brighter, like better for your mood too. Because I feel like most places are pretty, like colourless." Similarly, Student 2 contrasted the soothing colour palette of The Math Guru with the dullness of their standard school classrooms, stating, "The Math Guru is more, it's very colourful and, like…the colours, they are just not like a plain classroom, like...they just like feel very comforting" (see Figure 4 and Figure 11).

Appreciation for Indoor Plants. A profoundly positive regard was expressed by students for the presence of plants within their learning environments, noting improvements in both visual appeal and emotional well-being. In discussing the inclusion of indoor plants at The Math Guru, Student 2 succinctly stated, "There are plants, and like plants are like, proven to like make you happy" (see Figure 12 and Figure 15). This appreciation for indoor plants was similarly expressed by Student 1, who was particularly enthusiastic about their biology teacher's initiative to introduce them into the classroom, adding, "I think that once that happens, it's going to be a lot more of a less sterile vibe in the lab, which I'm excited for. Like, it also like, makes the air feel lighter with some plants." Student 3 also expressed a desire for the incorporation of nature into their standard school setting, sharing, "I feel like having like green, like plants would be a nice aesthetic they could add."

Theme 3: Student Preferences for Collaborative and Comfortable Learning Environments

This theme illustrates the student's appreciation for comfortable and collaborative learning environment design, as reflected in their preferences for the spatial dynamics and furniture within The Math Guru. It highlights how comfortable, interactive furnishings, such as communal tables, framed whiteboards, and diverse seating choices, impact students' academic experiences – drawing a comparison between the comfort of The Math Guru and the discomfort experienced in their standard school settings.

Preference for Collaborative and Inviting Design. The students expressed a strong preference for The Math Guru's collaborative approach to interior design. Student 3 specifically valued the studio's communal furniture arrangements, noting, "I like how the tables there are not just like alone and so a lot more people can work at them" (see Figure 6 and Figure 11). Acknowledging the interactive nature of The Math Guru's design, Student 1 commended the inclusion of whiteboards at each table, commenting, "I love the way that they have the like whiteboard set up there with the like big picture frames...when I was doing a lot of like math and stuff, that was my favourite" (see Figure 13 and Figure 16). Student 2 also expressed a positive view of The Math Guru's unconventional layout, describing their rewarding experience with a group exam preparation session: "When I did my exam prep, like…it was really great because it wasn't like a classroom setting...It didn't feel like I was in school." Similarly, Student 1 indicated that the inviting ambiance of The Math Guru was a key factor in their decision to enroll, referencing the initial description they read on the studio's website and stating, "It's more like your friend's basement or something like that."

Comfortable Seating Concerns. All three students emphasized the significant impact of furniture on their learning experiences, with a particular focus on the role of seating selection in either enhancing or hindering their ability to concentrate and learn effectively. Student 1 shared

their frustration with the quality of seating in their standard school setting, explaining, "I get distracted very easily at school. So, like if my chair creeks or like, you know when one leg of the desk is like shorter than the other ones…when that happens, it's like the whole period is ruined." In contrast, they also recalled a more positive experience at The Math Guru, where a similar issue was promptly addressed, recounting, "my tutor was like, 'you're not going to focus,' and then she switched the chair for me...and I think we told [the receptionist] that, that chair was wobbly." This student also recalled a preference for bean bag chairs offered in one of their previous classrooms:

> Those were my favourite, I would always race to class to try to get a beanbag chair. And, like, I don't know, it was just like very fun to sit in them and a lot more comfortable because school chairs are not very comfortable (see Figure 5 and Figure 6).

Resonating with this sentiment, Student 3 expressed the need for "comfier places to sit" in their standard school setting. Students 1 and 2 even fantasized about incorporating bedroom furniture into their classroom settings. Student 2 elaborated on this idea:

> I actually do a lot of homework in my bed if I'm gonna be honest, because I work like really well if I'm like sitting on something soft instead of like sitting in a chair, because like I don't have a very long attention span, so it's easier for me to just like, chill and do it, instead of like sitting there being uncomfortable.

Both of these students also expressed their admiration for the informal seating area in the main studio of The Math Guru (see Figure 5). Student 2 expressed a desire to see a similar area incorporated into their standard school environment, while Student 1 consistently praised "the pink couches" as a distinctly appreciated aspect of The Math Guru's learning environment (see Figure 5).

Theme 4: Student Preferences for Personalized Teaching and Supportive Student-Tutor Relationships

This theme explores students' appreciation for the individualized teaching strategies offered at The Math Guru and reflects on the uniquely informal and approachable relationships between students and tutors, differentiating these experiences from the more formal dynamics typical in their standard school settings. The relationship between The Math Guru's vibrant interior design and its effective teaching approaches is also noted.

The Effectiveness of Personalized Tutoring Approaches. All three students expressed their profound appreciation for the personalized teaching methods offered at The Math Guru. Student 2 specifically recognized the distinct advantages of tutoring when compared to traditional classroom instruction, remarking, "Obviously, having a tutor is like different than being in a classroom, like…how the tutors teach I would say like, they're very like, understanding...they would like specialize homework for me if I needed extra help or something like that." Student 1 also recounted positive learning experiences resulting from their tutor's effective approach:

> I had grade 11 functions and like, I could be confused the whole week and then see my tutor, and she would just like explain an entire week's worth of learning to me in like one hour. And it was like amazing, and just so helpful.

Notably, Student 3 drew a connection between The Math Guru's vibrant interior design and their tutoring experience:

> It's like it's so colourful there and everything, they have so much stuff going on, like games and stuff, and then they're also just more helpful. Like, it is a tutoring place I guess, but they're more like, helpful and like directed towards you, which is nice.

The Significance of Student-Tutor Relationships. The supportive and personal connections formed between students and their tutors at The Math Guru was also a recurrent theme across interviews. Student 1 expressed deep appreciation for their tutor, stating, "My tutor is like, like, my favourite person ever...I look forward to seeing her every week." Student 2 spoke to the informal and approachable nature of interactions at The Math Guru, noting, "The people at The Math Guru. I feel like you can just talk to them...Instead of at school. It's like a little more weird." In a similar manner, Student 3 discussed the increased comfort they felt in seeking academic assistance at The Math Guru, sharing, "I feel like I'm more comfortable to ask them questions and stuff, compared to school."

Discussion

The Influence of Interior Design on Student Well-Being

The Math Guru represents a thoughtful approach to interior design that prioritizes student well-being and contributes to a less stressful educational experience, reflecting contemporary trends in learning environment design and increasing focus on psychologically supportive and student-centred approaches. (Arndt, 2012; Hughes et al., 2019; Maich et al., 2018; Lelli, 2019; Scanlon & Baker, 2012; Willis et al., 2019). The interior design at The Math Guru is particularly aligned with key aspects of student well-being outlined by Hughes et al., (2019) incorporating elements that promote happiness, comfort, and interaction. In the present study, students expressed feeling less stressed, more engaged, and generally in a better mood at The Math Guru than in their standard school setting, highlighting how the studio's interior design significantly contributed to their satisfaction with academic pursuits.

Transforming the Learning Environment with Homelike Interior Design

The Math Guru represents a strategic and creative shift from standard school settings to a learning environment that mirrors the comfort of a thoughtfully designed home. Distinctly diverging from the sterile and uninspiring atmospheres of conventional classrooms – which students associate with increased stress and academic pressure – The Math Guru seeks to reshape student perceptions by providing an aesthetically pleasing and adaptable space conducive to more relaxed and enjoyable learning experiences (Andrews & Willis, 2019; Bandyopadhyay & George, 2020; Weinstein & Woolfolk, 1981).

The potential for The Math Guru's interior design to enhance student well-being is deeply rooted in the principles of environmental psychology, highlighting the significant impact of physical spaces on mental perceptions (Fleury-Bahi et al., 2017; Gifford et al., 2011; Ulrich, 1991). Furthermore, it aligns with key aspects of cognitive restoration, as discussed by Korpela (1992) and Korpela et al. (2001), suggesting that certain environments can promote psychological detachment from stress. The Math Guru's interior design, featuring cozy furnishings, soothing colour schemes, and the incorporation of greenery, reflects these theories, potentially providing a restorative sanctuary for students experiencing school-related stress, similar to a 'favourite place' (Kaplan, 1995; Korpela et al., 2001).

At the heart of The Math Guru’s interior design approach is the creation of a learning environment that resonates with Smith's (1994) concept of a home as a psychologically nurturing haven, offering warmth, support, and comfort. In line with more recent research on the psychology of residential design, which underscores the role of familiar and comfortable settings in enhancing mental health, this notion suggests that The Math Guru’s residential-style layout, cozy furnishings, and curated collection of décor can positively impact student perceptions and

contribute to an atmosphere conducive to relaxed and engaged learning (Glynn et al., 2021; Graham et al., 2015; Martín López & Fernández Díaz, 2022; Xiao et al., 2022).

Applying these frameworks to the objectives of the present study, The Math Guru's homelike approach to interior design emerges as a potentially powerful model for redesigning learning environments (Korpela et al., 2001; Smith, 1994; Weinstein & Woolfolk, 1981). The warm and welcoming design of The Math Guru tutoring studio fosters a comforting and inviting atmosphere, allowing students to feel at ease and engage in learning with a more focused and positive mindset (Fleury-Bahi et al., 2017; Kaplan, 1995; Kearns et al., 2000; Korpela et al., 2001; Smith, 1994; Ulrich, 1995).

Homelike Interior Design in Educational Research and Practice

Central to this case study research is the objective to provide a detailed and practical understanding of how interior design might be utilized to address school-related stress. In this sense, the homelike design approach of The Math Guru offers valuable insights, ideally inspiring educators, designers, and policymakers to explore designing learning environments that promote more positive experiences for high school students. Aligning with this study's objectives, the following section provides a detailed examination of The Math Guru's interior design approach, connecting specific design elements with existing research on learning environment design and student well-being (Arndt, 2012; Barrett et al., 2015; Benade, 2015; Hughes et al., 2019; Kariippanon et al., 2017; Lelli, 2019; Simmons et al., 2014). Complementing this discussion, an evidence-based guide inspired by The Math Guru's approach can be found in Appendix F.

Deepening Engagement and Interest through Meaningful Décor. The Math Guru's carefully curated use of décor, contrasting with uninspiring standard school settings, fosters an interactive and inviting learning environment. By incorporating elements that are not only

visually appealing but also functionally and thematically supportive of the learning process, such as artistically framed whiteboards and collections of math-themed artifacts, The Math Guru embodies Godwin & Kaur's (2021) principle of design relevance. Student feedback reveals their admiration for this decorative approach, acknowledging both The Math Guru's aesthetic appeal and engaging influence. Consistent with Cheryan et al.'s (2014) and Fisher et al.'s (2014) findings, the present study suggests that the incorporation of artistic elements and educational displays in The Math Guru enriches the learning environment and fosters a deeper level of learning interest.

Fostering Satisfaction and Calm through Color Usage. This study emphasizes the significant role of colour in influencing students' psychological responses (Küller et al., 2009; Yildirim et al., 2007). Aligning with Barrett et al.'s (2015) recommendations for well-being-focused learning environment design, The Math Guru's colourful interior design creates a visually pleasing and soothing setting for students. By strategically employing a combination of pastel tones with brighter accents, The Math Guru not only offers aesthetically pleasing surroundings to its students but also fosters a setting conducive to enjoyable learning and positive mental states (Barrett et al., 2015; Küller et al., 2009). These insights indicate that simple incorporations of colour, such as painting an accent wall or adding a vibrant area rug, can greatly improve student engagement and attitudes toward learning (Barrett et al., 2015; Walden, 2015).

Promoting Positive Emotions through Indoor Plant Incorporation. Students at The Math Guru profoundly appreciate the presence of indoor plants, acknowledging the aesthetic appeal of greenery and its contribution to increased happiness. These insights align with extensive research on the restorative effects of nature, particularly reflecting Park et al.'s (2008)

study on the correlation between indoor plants and stress levels among high school students (Fjeld, 2000; Han, 2009; van den Berg et al., 2017). The diverse selection of plants at The Math Guru – including large potted houseplants and small succulents – seemed to resonate with students, prompting them to express a desire for similar integration into their standard school settings. Accordingly, this study advocates for the integration of indoor greenery as an effective and accessible strategy for enhancing aesthetics and student well-being in standard school environments. The findings suggest that even small strategically placed plants can significantly enhance the learning environment and positively influence student experiences within it (Fjeld, 2000; Han, 2009).

Encouraging Confidence and Collaboration through Adaptable Spatial Dynamics. The spatial design of The Math Guru, characterized by its open floor plans and reconfigurable furniture arrangements, is a testament to the shift towards more flexible and student-focused learning environments (Benade, 2019; Chandler, 2009; Kariippanon et al., 2017). Contrasting sharply with the rigid, teacher-centric setups of standard school settings, The Math Guru's spatial design is inherently welcoming and adaptable, empowering students to engage with learning in ways that suit their individual preferences and needs (Benade, 2019; Kariippanon et al., 2017). Research indicates that such flexible spatial dynamics create a less intimidating environment, instilling the confidence in students at The Math Guru to actively participate in collaborative learning and seek academic support (Andrew & Willis, 2019; Benade, 2019; Kariippanon et al., 2017). Research by Barrett et al. (2015) further reinforces this notion, suggesting that a mix of open and private spaces, akin to The Math Guru's layout, significantly enhances students' comfort in engaging in discussions and accessing academic assistance.

Providing Physical and Psychological Comfort through Diverse Seating Selection. The Math Guru's choice of furniture is both creative and effective, incorporating a diverse range of vintage-style velvet sofas and various wooden dining sets that support the studio's emphasis on adaptability (Benade, 2019; Kariippanon et al., 2017). Students at The Math Guru notably prefer these diverse seating options, echoing Bandyopadhyay and George's (2020) finding that students seek a mix of formal and comfortable seating in their learning environments. The incorporation of comfortable furniture garnered particularly positive feedback from students, suggesting that these furnishings not only offer physical comfort but also contribute to psychological well-being (Cornell, 2002; Kariippanon et al., 2017; Umeda & Deitz, 2011). The findings of this study are consistent with existing research on the advantages of flexible furniture, supporting the notion that The Math Guru's diverse and high-quality furniture selection plays a role in enhancing student concentration and autonomy (Cornell, 2002; Kariippanon et al., 2017; Umeda & Deitz, 2011). Thus, while the distinct pink velvet couches at The Math Guru may not be practical in standard school classrooms, this study strongly reinforces the significance of offering ergonomic and diverse seating choices in educational settings to facilitate positive and uninterrupted learning experiences (Benade, 2019; Cornell, 2002; Hughes et al., 2019; Kariippanon et al., 2017; Willis et al., 2019).

Supporting Relaxation and Social Interaction through Living Room-Style Common Areas. At the heart of The Math Guru lies a living room-style common area, combining the studio's unique layout and furniture selection to create a central space for relaxation and socialization. This inviting and comfortable space plays a pivotal role in promoting open communication and casual conversations, which help students at The Math Guru effectively

employ their preferred social strategies for managing school-related stress (Anniko et al., 2018; Arndt, 2012; Ellis et al., 2020).

Interestingly, by blending the comfort-oriented design elements typical of early childhood classrooms with the specific social-focused needs of high school students, the design of this communal living room-like area uniquely aligns with recommendations from Maich et al. (2018) and Scanlon and Baker (2012) regarding the integration of ‘relaxation stations’ into secondary school learning environments (Anniko et al., 2018). Moreover, it reflects research on the psychological benefits of residential design, emphasizing that homelike environments can effectively promote supportive social interactions (Graham et al., 2015; Kearns et al., 2000; Smith, 1994). This residential concept is evident in The Math Guru, where the informal setup of couches encourages opportunities for relaxed interactions and conversations outside of formal tutoring sessions, providing students with a space to alleviate stress (Anniko et al., 2018; Lelli, 2019; Scanlon & Baker, 2012).

Recognizing that curriculum demands may restrict the feasibility of replicating a living room-style setup in standard high school settings, this study suggests repurposing underutilized spaces, such as the hallways where students informally gather or eat lunch, into thoughtfully designed relaxation stations. As noted by Hughes et al., (2019) these informal areas are essential in students' daily experiences and have the potential to be transformed into nurturing, student-centred spaces, supporting efforts to reduce school-related stress.

Integrating Teaching Approaches and Interior Design: The 'Third Teacher' Concept in Practice

The Math Guru distinguishes itself not only with its unique interior design but also through its high-quality teaching and the close connections fostered between tutors and students.

Drawing from environmental psychology and the insights of Weinstein and Woolfolk (1981), it becomes evident that interactions within the physical learning environment have a significant impact on student perceptions of that setting. Therefore, when interpreting the findings of this study, it is crucial to recognize that while The Math Guru's inviting interior design may play a substantial role in enhancing well-being and learning experiences, positive student perceptions of the physical space are likely influenced by the personalized and supportive tutoring provided. Student preferences for both the teaching methods and interior design at The Math Guru underscores the importance of considering interior design as a complement to educational strategies, rather than a standalone solution; both elements must collectively be understood and applied to promote an effective and supportive learning environment for students (Miller, 2019; Strong-Wilson & Ellis, 2007).

Analyzing The Math Guru’s interior design approach through the 'third teacher' framework, as articulated by Strong-Wilson and Ellis (2007), demonstrates the connection between the physical learning environment and pedagogical practices. At The Math Guru, the inviting and adaptable interior design not only complements but also enhances the capacity of tutors to provide personalized and attentive support, thus positively impacting students' overall perceptions. These insights offer valuable direction for future learning environment design, indicating that thoughtful interior design approaches when integrated with high-quality teaching, have the potential to contribute to more relaxed and engaging academic experiences for high school students.

Bridging the Gap: Interior Design Considerations in Standard School Settings

When considering the feasibility of The Math Guru’s homelike interior design approach across diverse learning environments, it is essential to recognize the inherent structural

limitations of certain settings. Notably, The Math Guru, functioning as a private tutoring studio, embodies a degree of adaptability in design not commonly found within public-school systems. Educators working within these contexts face constraints due to larger class sizes, demanding curriculum, and limited budgets, which hinder their capacity to modify their learning environments (Apps & MacDonald, 2012).

In response to these barriers, this study advocates for the introduction of simple yet effective interior design approaches within standard school settings, such as the incorporation of small indoor plants and individually painted accent walls. These strategies are not only impactful but also likely feasible within conventional constraints. Additionally, while this study encourages educators to explore creative solutions to integrating interior design within budgetary limits, it also acknowledges the essential role of policymakers in providing the necessary support and funding for these initiatives (Cheryan et al., 2014).

Addressing Sensory Diversity and Personalization

When considering the integration of interior design into standard school settings, it is crucial to address the challenge of meeting the diverse preferences, expectations, and needs of students. The Math Guru demonstrates a uniquely personalized and sensory-rich approach to interior design that benefits its students profoundly. However, applying certain elements of this approach in larger, more diverse public-school settings is expected to be a complex task (Barrett et al., 2015; Benade, 2019; Cheryan et al., 2014; Godwin & Kaur, 2021). Unlike private tutoring environments where students enroll voluntarily, public-schools cater to a broad student population, placing educators at an increased risk of alienating students if their personal design tastes do not resonate (Cheryan et al., 2014; Godwin & Kaur, 2021). Thus, incorporating personalized and sensory-rich interior design into these public-school settings demands a

particularly thoughtful, nuanced approach (Barrett & Barrett, 2010). This study advocates for ongoing research into universally accessible sensory-rich design strategies, emphasizing student participation to ensure they are tailored to varied needs and preferences.

Conclusion

This case study on The Math Guru tutoring studio's distinctive, homelike interior design provides profound insights into the transformative influence of the physical learning environment on the well-being and academic experiences of high school students. The research highlights the benefits of creating a learning environment that diverges from conventional educational settings by incorporating colourful aesthetics, indoor plants, comfortable furniture, and communal areas. These findings suggest that such a welcoming and appealing atmosphere not only contributes to less stressful academic experiences but also enhances students' engagement, mood, and ability to cope. Therefore, this study not only contributes to existing literature but also calls for continued research into more student-centered and well-being-focused interior design approaches. It advocates for a reimagining of educational spaces to better meet the holistic needs of students, envisioning a future where high school learning environments are designed to support both the psychological and academic success of students.

Limitations of the Present Study

While this research provides detailed insights into the interior design of The Math Guru tutoring studio, it also has inherent limitations. The study's focus on a singular, private studio setting may not fully encapsulate the varied complexities of diverse learning environments. Specifically, the adaptable nature of a private tutoring studio compared to public education environments may pose challenges in terms of replicability and feasibility. Additionally, the qualitative case study methodology, while instrumental in capturing students’ lived experiences,

inherently involves a degree of subjectivity (Simons, 2009). While this approach aligns with the study's aim to understand the school-related stress perceptions of high school students at The Math Guru, it may not represent the broad array of student experiences. Notably, the exclusively female participant pool in this study suggests that the findings might not fully capture the variety of perspectives or preferences that students of other gender identities may have towards the physical learning environment. The limited number of participants in the present study further narrows the transferability of findings. Finally, the lack of a longitudinal perspective limits insights into the long-term effects of The Math Guru's interior design on student well-being.

Opportunities for Future Research

These limitations present opportunities for future research, exploring how learning environments might be more thoughtfully designed to better support student well-being and decrease school-related stress. Future studies could extend these findings by examining the incorporation of similar homelike interior design elements in varied educational contexts, focusing on a broader range of participants and using more experimental and longitudinal-focused methodologies. Such research efforts might offer a deeper and more evidence-based understanding of the applicability and scalability of The Math Guru's homelike approach.

Ultimately, the key objective of this study, and perhaps therefore, subsequent research and practice, is to inspire more strategic and creative uses of interior design in the physical learning environment. The hope is that this case study on The Math Guru and its interior design acts as a catalyst for change, advocating for the reconsideration and redesign of physical learning environments that better align with the needs of our stressed-out students.

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Appendix A

Sample Founder/Designer Consent Form

INFORMATION AND CONSENT FORM

Study Title: Perceptions of School-related Stress and the Influence of Interior Design in High School Learning Environments: A Qualitative Case Study
Researcher: Sara Marks
Researcher's Contact Information:
Phone: (647) 448-1605
Email: sara.marks@concordia.ca
Faculty Supervisor: Dr. Miranda D'Amico
Faculty Supervisor's Contact Information:
Phone: 514-848-2424 ext. 2040
Email: miranda.damico@concordia.ca

You are being invited to participate in the research study mentioned above. This form provides information about what participating would mean. Please read it carefully before deciding if you want to participate or not. If there is anything you do not understand, or if you want more information, please ask the researcher.

A. PURPOSE

The purpose of the study is to address a gap in educational research by demonstrating how a uniquely designed learning environment might influence high school students' experiences and perceptions of school-related stress. By conducting research in the real-life learning environment of The Math Guru, this study will ideally shed light on the importance of interior design in high school learning environments and highlight areas where improvements can be made to enhance student experiences.

B. PROCEDURES

If you participate, you will be asked to take part in a one-on-one semi-structured interview lasting 60-90 minutes. This interview will take place at The Math Guru tutoring studio and will be focused on your experiences working with high school students who face school-related stress, your approaches to The Math Guru design process, and your advice for other educators. This interview will be audio recorded.

In total, participating in this study will take two hours.

C. RISKS AND BENEFITS

You might face certain risks by participating in this research. These risks include the participation in discussions about one's own (or others) experiences with stress, which may trigger uncomfortable or emotional reactions. For example, you will be asked to describe your clients' experiences with school-related stress and how you see this impacting their learning. There is also a very unlikely potential financial

risk to you as a founder if the study were to frame The Math Guru tutoring studio in a negative light. As such, the name of the centre and all participants will be kept confidential, and only data necessary to achieve the study objectives will be collected (e.g., student participants will not be asked about their relationships with their tutors or their delivery of services).

As the founder of The Math Guru, there is also some potential benefit. Participation in this study may enhance your knowledge regarding the interior design features most appreciated by high school students, allowing you to make more informed decisions when designing the space in the future.

D. CONFIDENTIALITY

We will gather the following information as part of this research:

- Information shared during your one-on-one interview (as discussed in the Procedures section)
- Observations – while you will not contribute directly to these observations, your participation in day-to-day activities may be observed without researcher interaction.

We will not allow anyone to access the information gathered, except people directly involved in conducting the research. We will only use the information for the purposes of the research described in this form. All data collected will be coded; this means that the information will be identified by a code and the researcher will have a list that links the code to your name.

We will protect the information by storing digital data (e.g., audio recordings) on a password-protected computer and all physical data (e.g., written notes) in a locked filing cabinet in the researcher's home.

We intend to publish the results of the research. However, it will not be possible to identify you in the published results. To allow for potential delays in submission and publication, data will be stored for two years following the study's completion, after which it will be permanently deleted.

F. CONDITIONS OF PARTICIPATION

You do not have to participate in this research. It is purely your decision. If you do participate, you can stop at any time. You can also ask that the information you provided not be used, and your choice will be respected. If you decide to withdraw from the study, please notify researcher Sara Marks and/or her faculty supervisor (Miranda D'Amico) by email or phone within 30 days of your interview (contact information can be found on page 1 of this form).

There are no negative consequences for not participating, stopping in the middle, or asking us not to use your information.

G. PARTICIPANT'S DECLARATION

I have read and understood this form. I have had the chance to ask questions and any questions have been answered. I agree to participate in this research under the conditions described.

NAME (please print) _____

SIGNATURE _____

DATE _____

If you have questions about the scientific or scholarly aspects of this research, please contact the researcher. Their contact information is on page 1. You may also contact their faculty supervisor.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

Appendix B

Sample Student/Adolescent Assent Form

ADOLESCENT ASSENT FORM FOR PARTICIPATION IN RESEARCH

Study Title: Perceptions of School-related Stress and the Influence of Interior Design in High School Learning Environments: A Qualitative Case Study

Researcher: Sara Marks
Researcher's Contact Information:
Phone: (647) 448-1605
Email: sara.marks@concordia.ca
Faculty Supervisor: Dr. Miranda D'Amico
Faculty Supervisor's Contact Information:
Phone: 514-848-2424 ext. 2040
Email: miranda.damico@concordia.ca

Dear student,

We are inviting you to participate in a master's level research study to explore how a uniquely designed learning environment can influence high school students' experiences of school-related stress. By conducting research in the real-life learning environment of The Math Guru, this study will ideally shed light on the importance of interior design in high school learning environments and highlight areas where improvements can be made to enhance student experiences.

As a participant, you will be asked to take part in:

- A 30-minute student-led tour. You will begin the study by leading the researcher on a tour of The Math Guru, where you will be asked to point out interior design features that you associate with learning, stress, or relaxation.
- A 60-90-minute one-on-one interview. This interview will take place at The Math Guru tutoring studio and will be focused on your experiences of stress related to school, your opinions of the interior design of The Math Guru tutoring studio, and how your experiences in traditional learning settings (like your everyday classroom) compare to your experiences at The Math Guru. This interview will be audio recorded.

Potential risk(s): Participation in discussions that have the potential to trigger uncomfortable or emotional reactions. For example, you will be asked to describe your experiences with school-related stress and your ability to cope with this stress. Sharing your experiences with stress and/or mental illness may also lead to feelings of fear or worry concerning possible judgement or stigmatization. As such, to protect your privacy throughout the study, any identifying information, including your name, will not be included. You will also be given the opportunity to review and provide feedback on the final study prior to publication. While all efforts will be made to ensure your privacy (including completing research outside of regular business hours), it cannot be guaranteed that your participation in a student-led tour and/or interview will not be witnessed by an outside party and that they will respect your confidentiality.

Potential benefit(s): By taking part in this study, you will have the opportunity to share your experiences with school-related stress and perspectives on interior design, with the potential for you to develop a greater understanding of how interior design affects your learning and your preferences for interior design in different learning environments.

This study will collect the following information:

- Information shared during your student-led tour and one-on-one interview.
- Observations – while you will not contribute directly to these observations, your participation in day-to-day activities may be observed without researcher interaction.

We will protect the information by storing digital data (e.g., audio recordings) on a password-protected computer and physical data (e.g., written notes) in a locked filing cabinet in the researcher's home. To allow for potential delays in submission and publication, data will be stored for two years following the study's completion, after which it will be permanently deleted.

Conditions of participation: You do not have to participate in this research. It is purely your decision. If you do participate, you can stop at any time. You can also ask that the information you provided not be used, and your choice will be respected. If you decide to withdraw from the study, please notify researcher Sara Marks and/or her faculty supervisor (Miranda D'Amico) by email or phone within 30 days of your interview (contact information can be found on page 1 of this form). There are no negative consequences for not participating, stopping in the middle, or asking us not to use your information.

If you and/or your parent(s)/guardian(s) have any questions about this study, they can contact the researcher and/or faculty supervisor by email or phone using the contact information on page 1 of this form.

Would you like to **participate** in this research study?

_____ I consent to participate in the student-led **tour** AND one-on-one interview.

_____ No, I don't want to do this.

NAME (please print) _____

SIGNATURE _____

DATE _____

Appendix C

Sample Parental Consent Form

PARENTAL INFORMATION AND CONSENT FORM

Study Title: Perceptions of School-related Stress and the Influence of Interior Design in High School Learning Environments: A Qualitative Case Study
Researcher: Sara Marks
Researcher's Contact Information:
Phone: (647) 448-1605
Email: sara.marks@concordia.ca
Faculty Supervisor: Dr. Miranda D'Amico
Faculty Supervisor's Contact Information:
Phone: 514-848-2424 ext. 2040
Email: miranda.damico@concordia.ca

Dear Parent(s)/Guardian(s),

Your child is being invited to participate in the research study mentioned above. This form provides information about what their participation would mean. Please read it carefully before deciding if you want your child to participate or not. If there is anything you do not understand, or if you want more information, please ask the researcher.

A. PURPOSE

The purpose of the research is to address a gap in educational research by demonstrating how a uniquely designed learning environment might influence high school students' experiences and perceptions of school-related stress. By conducting research in the real-life learning environment of The Math Guru, this study will ideally shed light on the importance of interior design in high school learning environments and highlight areas where improvements can be made to enhance student experiences.

B. PROCEDURES

- Student-led tour lasting up to 30 minutes. Your child will begin the study by leading the primary investigator on a tour of The Math Guru, where they will be asked to point out interior design features that they associate with learning, stress, or relaxation.
- One-on-one semi-structured interview lasting 60-90 minutes. This interview will take place at The Math Guru tutoring studio and will be focused on your child's experiences of stress related to school, their opinions of the interior design of The Math Guru tutoring studio, and how their experiences in traditional learning settings (like their everyday classroom) compare to their experiences at The Math Guru. This interview will be audio recorded.

In total, participating in this study will take two hours.

C. RISKS AND BENEFITS

Your child may face certain risks by participating in this research. These risks include the participation in discussions that have the potential to trigger uncomfortable or emotional reactions. For example, your child will be asked to describe their experiences with school-related stress and their ability to cope with this stress. Additionally, when discussing their experiences with stress and/or mental illness, your child may encounter fear or worry concerning possible judgement or stigmatization. To protect your child's privacy throughout the study, any identifying information, including their name, will not be included. To further ensure accuracy and confidentiality, your child will also be given the opportunity to review and provide feedback on the study's findings prior to publication. While all efforts will be made to ensure your child's privacy (including completing research outside of regular business hours), it cannot be guaranteed that your child's participation in a student-led tour and/or interview will not be witnessed by an outside party and that they will respect their confidentiality.

As a student participant, there is also some potential benefit. By taking part in this study, your child will have the opportunity to share their experiences with school-related stress and perspectives on interior design, with the potential for them to develop a greater understanding of how interior design affects their learning and their preferences for interior design in different learning environments.

D. CONFIDENTIALITY

We will gather the following information as part of this research:

- Information shared during your child's student-led tour and one-on-one interview (as discussed in the Procedures section)
- Observations – while your child will not contribute directly to these observations, their participation in day-to-day activities may be observed without researcher interaction.

We will not allow anyone to access the information gathered, except people directly involved in conducting the research. We will only use the information for the purposes of the research described in this form. The information gathered will be coded; this means that the information will be identified by a code and the researcher will have a list that links the code to your child's name.

We will protect the information by storing digital data (e.g., audio recordings) on a password-protected computer and physical data (e.g., written notes) in a locked filing cabinet in the researcher's home.

We intend to publish the results of the research. However, it will not be possible to identify your child in the published results. To allow for potential delays in submission and publication, data will be stored for two years following the study's completion, after which it will be permanently deleted.

F. CONDITIONS OF PARTICIPATION

Your child does not have to participate in this research. It is purely your and their decision. If your child does participate, they can stop at any time. You or your child can also ask that the information they provided

not be used, and this choice will be respected. If you or your child decide to withdraw from the study, please notify researcher Sara Marks and/or her faculty supervisor (Miranda D'Amico) by email or phone within 30 days of their interview (contact information can be found on page 1 of this form).

Your child will not face any negative consequences for not participating, stopping in the middle, or asking us not to use their information.

G. PARTICIPANT'S DECLARATION

I have read and understood this form. I have had the chance to ask questions and any questions have been answered. I agree to my child's participation in this research under the conditions described.

NAME OF CHILD (please print) _____

NAME OF PARENT/GUARDIAN (please print) _____

SIGNATURE OF PARENT/GUARDIAN _____

DATE _____

If you have questions about the scientific or scholarly aspects of this research, please contact the researcher. Their contact information is on page 1. You may also contact their faculty supervisor.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

Appendix D

Student Interview Guide

Experiences with School-Related Stress:

1. What is your name? What school do you go to and what grade are you in?
2. How would you describe your experience of stress at school? What types of situations tend to make you feel the most stress?
3. Are there certain places or spaces at school where you notice you experience more stress?
4. What strategies do you use to cope with school-related stress?

Comparing Learning Environments:

1. How long have you been attending tutoring sessions at The Math Guru?
2. How would you describe your experiences with learning at The Math Guru in comparison to your everyday classroom?
3. How does your experience of school-related stress at The Math Guru compare to your experiences in your everyday classroom?
4. Describe the interior design of your everyday classroom – how does it differ from The Math Guru? What do you prefer about the design of each environment? Are there any design elements in either setting that you find particularly distracting or stressful?

The Interior Design of The Math Guru:

1. When you first started tutoring at The Math Guru, what were your first impressions of the interior design of the space? How did you feel entering this space compared to when you walk into your everyday classroom?
2. How do you think The Math Guru's interior design impacts your learning experience?
3. Do you think the interior design of The Math Guru impacts your experiences of school-related stress in any way?

Ideal Learning Environment:

1. If you had the opportunity to redesign your school's classrooms to reduce stress and enhance learning, what changes would you make?
2. Are there any elements of The Math Guru that you think would benefit the interior design of your everyday classroom?
3. Are there any interior design elements – whether that be lighting, paint, décor, plants, furniture, or anything else – that you have in your home or have seen elsewhere that you think would make either The Math Guru or your everyday classroom a less stressful environment?

Appendix E

Educator Interview Guide

1. Can you please tell me a little bit about your professional background and how this led you to become the founder and interior designer of The Math Guru tutoring studio?
2. Where did your inspiration for the interior design of The Math Guru come from? What were your specific design goals, and why did you choose them?
3. Do you think that interior design can play a role in addressing or alleviating school-related stress? In your design process, did you consider how the space might impact high school students facing school-related stress?
4. Can you tell me a little bit about your experiences working with high school students who experience school-related stress? How have you seen this stress manifest in the students you work with?
5. In your experience, how does the interior design of The Math Guru influence student stress? Can you give me an example of a specific design element that you feel has had a positive impact on student stress levels?
6. How do you think the design of The Math Guru compares to other learning environments in terms of stress reduction or learning enhancement?
7. What recommendations would you give to other educators or designers who are looking to create learning environments that support students' well-being and reduce stress?

Appendix F

A Comprehensive Guide to The Math Guru's Homelike Interior Design

A COMPREHENSIVE GUIDE TO THE MATH GURU'S HOMELIKE INTERIOR DESIGN

This guide, inspired by the homelike interior design of The Math Guru tutoring studio, and supported by extensive existing research, aims to inspire educators, designers, and policymakers to consider more creative, well-being-focused redesigns in their learning environments. When considering these guidelines, it is recommended that educators consider how each aspect of interior design – from colour scheme selection to spatial dynamics – can be incorporated not just functionally and aesthetically but also in direct partnership with the pedagogical preferences and learning needs of students (Miller, 2019).

1. **Deepening Engagement and Interest through Meaningful Décor:** Incorporate décor into the learning environment to engage students more actively, as The Math Guru does with its artistically framed whiteboards and math-themed decorations. This approach, rooted in design relevance, can transform the physical environment, not only enhancing visual aesthetics but also potentially inspiring academic interest and making learning more appealing and engaging (Godwin & Kaur, 2021; Cheryan et al., 2014; Fisher et al., 2014).
2. **Fostering Satisfaction and Calm through Color Usage:** Adopt a colour palette that blends calming pastels with vibrant accents. As seen in The Math Guru, this strategic use of colour can create a warm and welcoming ambiance, with the potential for positive impacts on students' emotional experiences and learning interests (Barrett et al., 2015; Küller et al., 2009; Walden, 2015).
3. **Promoting Positive Emotions through Indoor Plant Incorporation:** Mirror The Math Guru's use of greenery, which resonates with theories on the restorative benefits of nature and promotes aesthetic value while also enhancing students' moods. Even small, strategically placed plants might help to revitalize the learning environment and support enhancements in student well-being by making the environment more enjoyable and potentially even stress-reducing (Fjeld, 2000; Han, 2009; van den Berg et al., 2017).
4. **Encouraging Confidence and Collaboration through Adaptable and Unconventional Spatial Dynamics:** Design adaptable, student-centred environments inspired by The Math Guru's homelike layout that caters to academic support as well as casual conversation. Even in limited spaces, creating small zones dedicated to specific learning activities can

help boost student confidence and interest in collaboration (Benade, 2019; Chandler, 2009; Kariippanon et al., 2017).

5. **Providing Physical and Psychological Comfort through Diverse Seating Selection:** Offer students more control over their learning and comfort by embracing The Math Guru's approach to furniture and incorporate a diverse mix of seating options, such as dining chairs, armchairs, and couches. This design strategy, resonating with preferences for physical comfort and fostering a sense of autonomy over the learning environment, allows students to choose a seat most optimal for their learning and, as such, can help to promote focus and empowerment in learning, (Cornell, 2002; Kariippanon et al., 2017; Umeda & Deitz, 2011).

6. **Supporting Relaxation and Social Interaction through Living Room-Style Common Areas:** Create common areas for relaxation and social interaction inspired by The Math Guru's living-room-style seating area. By promoting open communication and casual conversation, these areas offer opportunities for informal interaction that resonate with high school students social-focused coping strategies (Anniko et al., 2018; Arndt, 2012; Ellis et al., 2020; Maich et al., 2018; Scanlon & Baker, 2012).

Appendix G

Executive Summary

Background of Study: Recognizing the profound influence of the physical learning environment on student well-being and learning perceptions, this case study explores the potential relationship between interior design and school-related stress. In doing so, it acknowledges the evolving focus on creating learning environments that are not just functional but also psychologically supportive.

Purpose of Study: The aim of this study is to explore high school students' perceptions of school-related stress within the unique interior design of The Math Guru tutoring studio. It seeks to understand how The Math Guru's interior design, which significantly departs from conventional educational settings, might influence students' well-being and learning perceptions and experiences.

Methods This study follows a qualitative case study research design, featuring data collected through in-depth, semi-structured interviews, digital photography, and on-site observations. The participants include the founder of The Math Guru and three high school student clients. Collected data was interpreted using a thematic analysis method to provide a rich understanding of The Math Guru's interior design approach and its potential influence on the well-being and learning perceptions of students.

Findings & Discussion: This case study found that The Math Guru's physical learning environment, characterized by homelike interior design elements and approaches, significantly contributes to fostering an atmosphere that is less stressful for its students compared to their standard high school settings. The unique design elements of The Math Guru were perceived positively by students, fostering an inviting and relaxed, yet still engaging and supportive learning environment. The insights from this study underscore the importance of thoughtful interior design in educational contexts. The Math Guru's approach aligns with contemporary theories emphasizing the necessity of rethinking learning environment design to prioritize student well-being and engagement.

Conclusion: This study advocates for secondary educational institutions and learning environments to consider interior design as a key factor in enhancing student engagement and addressing school-related stress. It illustrates The Math Guru's homelike design approach as an inspiring model for future learning environments, promoting spaces that are not only aesthetically pleasing but also conducive to learning and supportive of student mental health.