

Perry's Scheme of Intellectual and Ethical Development  
Influence on Duckworth's Short Grit Score  
In Interior Design Students

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## **Abstract**

Assignments that require multiple design solutions can be a formidable task for first year interior design students. The curriculum for these interior design students requires them to generate multiple solutions for any design problem. This study looks at interior design students' intellectual development to investigate if intellectual development influences their ability to be persistent in the curriculum. Perry's Scheme of Intellectual and Ethical Development, as determined by the Measure of Intellectual Development, and Duckworth's Short Grit score are the instruments used in this study. Participants were 15 second semester interior design students. Each completed Angela Duckworth's Short Grit Survey and Essay A of the Model of Intellectual Development. The collected data was analyzed using ANOVA and Correlation tests. Initial findings suggest a weak negative correlation, and no statistical relation between the two variables. However, the limitations to the study warrant further examination.

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## CHAPTER ONE: INTRODUCTION

Practicing interior designers need to draw upon different information from a variety of areas. They express design ideas using verbal, written, and graphic communication skills, and employ math and social science knowledge. Skills used to explore, critique, and produce multiple design solutions can be difficult to instill in first year interior design students. Providing clients with multiple solutions to a design problem is a skill that interior designers must have. By exploring multiple and varied options to a design problem, an interior designer refines these options into two or three appropriate solutions to discuss with their clients. Interior designers use this knowledge and their skills to weigh multiple factors to produce multiple possibilities in order to determine the optimal solution.

First year students attending interior design classes have been described as having poor creative thinking skills (Carmel-Gilfilen, 2010), and lacking the ability to provide multiple solutions to a single problem. This has been noted in a similar study of engineering students (Marra, Palmer, & Litzinger, 2000).

In all disciplines of design, however, there are many “correct” answers, each with merit and weaknesses. Although eager to learn, incoming freshmen come with incorrect or distorted perceptions of what the discipline requires to be successful in the field, the ease of learning the profession, and the amount of time a student needs to commit to become a successful designer. How do students set themselves up to be persistent and produce more options when they reach an impasse? What has influenced students in the past?

Coming from an elementary through high school education where standardized testing is the norm (e.g. No Child Left Behind), exploration of multiple answers to an assignment is not stressed in the classroom. Many first year students ask, “What do I need to do for an A?” Students have learned in the past 12 years that there are correct answers, and incoming freshman are accustomed to direct instruction that leads to a “correct” answer.

There are many other outside influences on incoming students’ expectations of what interior design entails. Television programs like Extreme Makeover and print media do not fully explain the design process, nor the amount of time required to complete projects. Mass media condenses the whole timeline into one 30-minute program (and then subtracts for commercials) or a three-page article, neither fully explaining nor showing, the entire scope of work. Once these external perceptions are corrected, first year students are challenged to perform in a rigorous academic setting, learning all the initial skill sets.

The non-cognitive trait of perseverance or grit is a skill that is difficult to teach. Perseverance or grit may be fostered if an instructor can understand the student’s source of knowledge described in Perry’s Scheme of Intellectual and Ethical Development and a student’s perseverance Short Grit Score. This study explored the relation between the positions in Perry’s Scheme of Intellectual and Ethical Development (Perry, W. G., 1999) to perseverance, as measured Duckworth’s Short Grit score (Duckworth & Quinn, 2009).

#### *Research Statement*

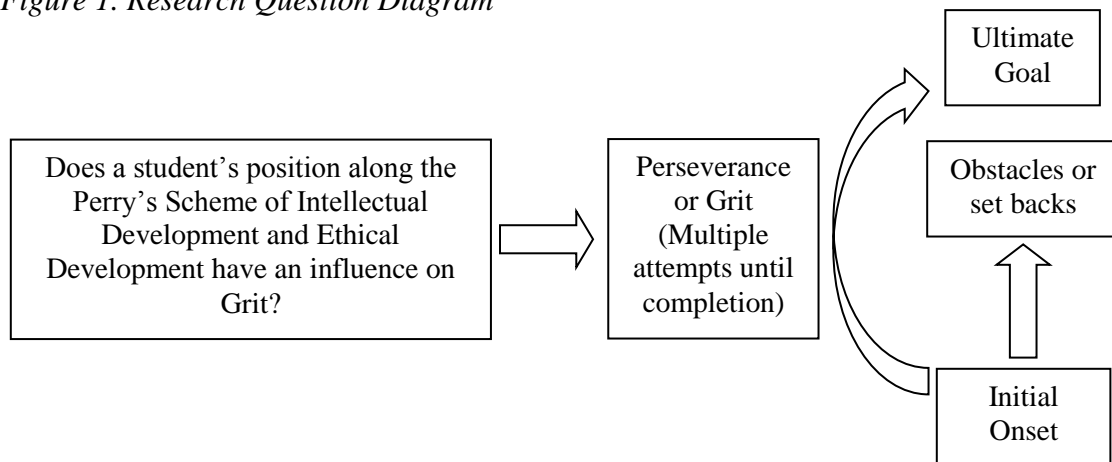
Does the student’s position along Perry’s Scheme of Intellectual and Ethical Development influence his or her Short Grit Score? This information could be useful in

constructing lesson plans designed to foster a more appropriate learning mindset, and may help maintain or increase student retention within an interior design program. The relationship addressed in this research is to determine a student's placement along Perry's Scheme of Intellectual and Ethical Development as the independent variable, and a student's perseverance in school, the dependent variable, using Duckworth's Short survey.

#### *Purpose and Objective*

The purpose of this study is to explore the relationship between the positions of Perry's Scheme of Intellectual and Ethical Development to perseverance, as measured by the Short Grit scale. The continuum of intellectual development progresses from dualism, where there are only right and wrong answers, through a series of exceptions and explorations of multiple answers leading to the learning process itself as transformational in the student's identity as a source of knowledge (Moore, 1994). As noted by Duckworth (Duckworth, et al., 2007), intelligence and talent are not the defining trait for success in long-term goals. By using these two instruments in tandem, research may possibly be able to determine where the stages of intellectual development and perseverance in a subject are influential in the student's academic career, and apply this information to curriculum and instruction (see Figure 1).

Figure 1. Research Question Diagram



This study may well serve as a starting point for studying perseverance among interior design students, as commitment requires determination and a deeper appreciation of a long-term goal. Perseverance or grit studies using Perry's Scheme of Intellectual and Ethical Development as an independent variable have not been located in a search of the literature for interior design students in specific, nor for design students as a whole.

#### *Definition of Terms*

Intellectual Development Theory: How students understand the world and the nature of knowledge (King, 1978) expressed in this paper using a continuum of Perry's Scheme of Intellectual and Ethical Development from Position One through Position Nine.

Perseverance: Finishing what one starts, completing a course of "goal-directed action in spite of obstacles, difficulties, and discouragement" (Peterson and Seligman, 2004).

Grit: Perseverance and passion for long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007).

## CHAPTER TWO: REVIEW OF LITERATURE

### *Cognitive Development, Intelligence, and Intellectual Development Theory*

In this chapter, Cognitive Development and Intellectual Development Theory explain how people understand the world using their ability to process, recall, and apply information. Piaget, Vygotsky, Sternberg, and Perry have similar theories of how people progress in stages. Understanding how students process information differs by theory and by the age groups studied. Piaget (2008), Vygotsky and Kozulin (2012), Sternberg (2009), and Perry (1999) denoted stages of cognitive or intellectual development that shared common traits but differed in categories when describing the progressive steps in a child's development. Determining the placement of the student along the continuum of Perry's Scheme is determined using the Measure of Intellectual Development (MID).

Jean Piaget's Theory of Cognitive Development is based on how individuals interact with the environment, from the simple needs of an infant to complex interactions requiring abstract thinking and reasoning. Piaget structured his findings based on four operational mental structures utilized in dealing initially with physical objects in the environment: Sensorimotor operations deal with the child's reaction to objects in the environment and the environment. Pre-operational development is a time dominated by self-oriented actions. In concrete operational, children are aware that there may be more than one point of view and may not consider outcomes. Finally, formal operational is described as having abstract thinking and theoretical reasoning (Presnell, 2014). Not all people reach the fourth stage of Piaget's cognitive development. Initial study participants were children and young adolescents, and later included college-aged participants.

Because Piaget's theory does not distinguish if the source of knowledge is internal or from outside influence, this study did not follow Piaget's theory structure.

Both Piaget's Theory of Cognitive Development and Perry's Scheme of Intellectual and Ethical Development address intellectual development; each was curious about how the participants acquired knowledge and processed this information to understand their environment. They differ in the perspective of how students understand and interact with their surroundings. Each used different descriptors to express how their participants interacted and, initially, each used differing age groups. Perry's theory differs from Piaget in that each describes a different process of development, and each has unique assessments (Perry, et al., 1986).

Lev Vygotsky's Sociocultural Theory is a combination of social environment and culture as a model for intellectual development. Four principles describe how children progress in their cognitive development. Children make their own knowledge. Self-talk or private speech is used as children guide themselves through solving problems. Cognitive development cannot be separated from culture. Vygotsky's zone of proximal development (ZPD) describes how children complete tasks with the assistance of more skilled companions. Learning can result in furthering the child's cognitive development, either by self-taught methods or with the assistance of others. Language is the fourth principle Vygotsky's theory employs. Dialogue between child and instructor supports the child's ability to practice new cognitive skills and to develop new, increasingly complex strategies of development (Gallagher, 2014).

In Vygotsky's theory, the connection between culture and learning is difficult to separate or measure. The child's learning is self-centered, and critical thinking skills may not be acquired if someone with these skills is not available to the child.

Sternberg's triadic theory proposes three categories to discuss intelligence: analytical, practical, and creative. Problems that use analytical intelligence have well-defined criteria, have all the required information provided, and have only one answer, much like elementary and high school settings. Problems that rely on practical intelligence are often poorly defined, rely on information seeking, have multiple solutions, and require motivation and active involvement. Creative intelligence deals with novelty or automation of tasks (Sternberg, 1984).

The ability to seek multiple solutions to a design problem and to demonstrate these solutions are requirements of schematic design in the interior design process. The need for motivation as a criterion for this type of intelligence is important in this paper, as class assignments challenge students of interior design with open-ended design problems to solve (Neisser, et al., 1996). Motivation to succeed is part of the drive to preserve. Yet, a highly motivated student may be failure-adverse and not persevere when faced with mastering a skill or subject. The motivation to not fail, overcomes the drive to preserve in the task or even to not accept the challenge of the task, and only take on challenges that appear surmountable.

Perry's Scheme of Intellectual and Ethical Development is used in this study because it identifies the source of knowledge and how individuals use this source of knowledge to process complex problems or ideas. As a student matures and acquires

greater thought processing skills, understanding the complexity of his or her world also matures.

Perry's model participants were based on men's responses; the women who were part of the initial study differed in content but not experience in the development of intellect. Although Baxter Magolda's model of Epistemological Development and Belenky's model developed in *Women's Ways of Knowing*, Belenky, et al., acknowledge a difference in gender perspectives, each has similar categorizations and perspectives to Perry (Felder & Brent, 2004).

Perry's Scheme of Intellectual and Ethical Development divides a student's intellectual development into nine positions within four major categories: Dualism, Multiplicity, Contextual Relativism, and Commitment to Relativism (See Table 1) (Perry, 1999).

Table 1  
*Positions of Perry's Scheme of Intellectual and Ethical Development*

Position	Possible answers	Source of knowledge or authority	Students relation to authority	
Dualism Positions 1&2	Right and wrong; Black and white. Only one correct answer, yes or no.	Authority has absolute truth. Only one authority for the subject. "My dad has the only right answer, your dad is just wrong."	Student receives knowledge.	1-There is only one authority. 2-The second authority is wrong, not the answer given by the authority.
Multiplicity Positions 3 &4	Third option to an answer, yet unknown.	Conflict between multiple "good" authorities.	3-Student seeks one true answer. 4-Hard work is not enough, independent thought required.	3- "If I just work hard, I'll get to the right answer."  4-Becomes aware of ownership of answer, but lacks context so all answers are arbitrary. "It's all arbitrary to me."
Contextual Relativism Positions 5&6	Multiple answers	5- Can be chaotic not knowing best approach to solving problems. 6- Becomes imparter of knowledge.	Student becomes source of knowledge and answer.	5- Multitude of correct answers based on context.  6- Problem solving requires defining rules to process correct answer.
Commitment within Relativism Positions 7,8&9	There may not be a correct answer.	Commitment based on ethics to sort out difficult and sometime contradicting information.		7, 8- Best answer based on weighing all information.  9- There may not be a best answer, but will remain persistent to attain.

Within these categories, two or three positions are identified; William S. Moore (1994) explained the categories and positions as follows:

Dualism (Positions 1-2) is defined as black and white thinking, categorizing answers as either "right" or "wrong." Absolute truth is provided by an authority, such as

religion, teachers, or parents, and is unwavering. No other explanation for the situation is possible in this category. Students seek single correct answer from the teacher. Position 2 does allow for more than one answer but does not expand the intellectual development of the student. The difference between Position 1 and Position 2 in the Dualism category is that in Position 2, information that does not fit the student's "right or wrong" knowledge comes from an authority that is wrong, not the answers provided.

Multiplicity (Positions 3 -4) development starts to occur when there is a conflict among several good authorities. The development of a third answer to the problem, the "not yet known" option, provides an experience of legitimate uncertainty, when two trusted sources of information are in conflict and that the correct answer is yet to be found . This leads students to believe there are right ways and wrong ways to achieve the true answer. This process or method based approach (Position 3) still falls under the "there is a correct answer" reasoning of the student and leads to the notion that if the student is diligent and proceeds through the process, the student's hard work will pay off in good grades. There is still a significant portion of dualism (a correct or incorrect answer) in this position, but with the introduction of other possible solutions being available to explore, the "only one correct answer" starts to be eroded in the student's perspective. Position 4 is reached when students realize that hard work is not enough and that independent thought is required to make sense of a particular problem. This is where self-processing and awareness of ownership of their own ideas comes in. What is lacking in this position is the student's ability to place problems into a contextual relativism. In Position 4, the student may express that all ideas are arbitrary to oneself and that there is no non-arbitrary basis for decision making.

Contextual Relativism (Positions 5-6) occurs in the student when their view of the world progresses from dualism; it entails an ever-increasing number of exceptions to the “correct answer” in very specific situations as well as the reverse, where there can be a multitude of correct answers depending on the context in which they are framed. Position 5 is still rather ridged and chaotic, and somewhat difficult to discern the best approach to problem solving, in contrast to Position 6, where thoughts ebb and flow between options. In Position 6, the student has become aware of the importance of defining rules, has become comfortable in their own knowledge, and has become the imparter of knowledge, the person who knows the correct answer(s).

The last category, Commitment within Relativism (Positions 7-8), deals with the ethics of commitments to decisions made, based on complex and sometimes contradictory information. Position 9, which also falls within Commitment within Relativism, is described as the realization that there may not be a correct or best answer but that great effort is required to remain persistent in pursuing it.

*Perry's Scheme: Deflections, Tempering, Escape, and Retreat.*

Perry's Scheme of Intellectual Development usually is not linear and may progress at different rates throughout a student's life. Students may have periods of rapid intellectual development followed by lapses. They may only reach a certain stage of development. Each position along Perry's Scheme of Intellectual Development has modifiers that describe these conditions.

During these periods of development, students may find themselves overwhelmed, confused, or frustrated with the learning environment and assignment tasks. In the multiplicity stage (Positions 4, 5, and 6) students may struggle with self-assuredness, and

again in the stage of commitment (7, 8, and 9), with wavering towards commitment to responsibility. In these instances, the students may deflect from their development track. Temporizing is a delay, for a time, of moving forward in the development. This may last a year or so, and is characterized by a student's realization that they are not ready. The student may remain in a position of development until they are interested in the subject again, or they feel responsible for their own growth.

Escape or retreat, considered a stop or reversal of intellectual development, may happen during the multiplicity stage. During the multiplicity stages, Position 6 in specific, a student may consider since all knowledge is relative with fully understanding the context of their knowledge, escape may be the best option when contradictory information cannot be processed. During this time, the student may express anger and frustration. This stage is different from tempering: in tempering, students understand they are in a process that will take time to adjust. In escape, development halts. Reverting to an earlier position or retreating can happen in any position but seems most common in Position 5 or 6. Retreating into dualism to process information describes this action. The student will return to the process acting on impulse and avoid the complexities of reason.

#### *Measure of Intellectual Development (MID)*

The instrument used for Perry's Scheme of Intellectual and Ethical Development is the Measure of Intellectual Development (MID), an essay-based test that rates and assigns a position along Perry's Scheme (The Perry Network, 2012). Two trained raters review the essays, and three digit score describing their placement along the continuum. For example, a score of 333 places a student squarely in Early Multiplicity. A score of

334 indicates a transitioning into the next position, Late Multiplicity (Association of American Colleges and Universities, 2012).

#### *Other Studies using Perry's Scheme*

Perry's scheme is a tool used to study non-cognitive aspects of learning. Perry's scheme has been used in intellectual studies regarding gender (Baxter Magolda, 1992), work experience (Brown, 2002; Knouse, Tanner, & Harris, 1999; Ryan & Cassidy, 1996), class standing ((Hood & Deopere, 2002; Kitchener & King, 1989; Palmer, Marra, Wise, & Litzinger, 2000), and as cited in Carmel-Gilfilen (2012), design experience for first year engineering students (Marra, 2000). Clarkeburn, Downe, Gray, & Matthew used the scheme in developing a model to measure ethical development (Clarkeburn, 2003).

#### *Identity and Intellectual Development*

Identity and intellectual development were shown to have a relationship. Freshman with a raised self-awareness related to a higher intellectual development by their sophomore year (Buczynski, 1991), which supports Dr. David Allen (Allen, 1999) as students better prepared for schooling had lower attrition rates. This is important for this study, as completing the first year of schooling is the measurement for perseverance.

Approaching the topic of adult cognitive development, Mary Field Belenky, et al., (1986) and Marcia Baxter Magolda (1992) cite Perry in their work. All three used college students as participants for their studies; men and women in Perry's and Baxter Magolda, and women alone in Belenky's research. Gender may have an impact on cognitive development. Belenky uses different descriptors, but the categories can be equated to Perry (Felder & Brent, 2004). Perry developed a structure describing an individual's relation to authority, where knowledge comes from, and assumptions about the nature of

knowledge, ranging from well-defined to contextual (Perry, et al., 1986). This structure of Perry's Scheme of Intellectual and Ethical Development is modeled on stages of development that were determined from interviews of student's at Harvard and Radcliff Colleges. Radcliff was an all-women's college at the time, and with Harvard, provided men and women in their four-year academic sequence. Four hundred sixty-four interviews were conducted, 84 with complete academic sequences. Only two of these complete sequences were from Radcliffe and were removed from the study. The remaining interviews, although not in the full sequence, were rated and were found to be reliable against the scheme. Differences in men and women were found in content and manner, but similar in the structure of experience in the development and placement in the scheme (Perry, 1999).

#### *Academic Settings to Support Perseverance*

Factors that can promote or undermine a student's perseverance range from a developmental stage and time scale to complexity and content (US Dept. of Education, 2013). Physical environment, proper equipment and technology, and human resources to administer and support the curriculum are areas that need attention. Time is another valuable resource for students and instructors alike. Time is required for incubation of ideas, reflection, peer review, and instructor assessment.

In the academic setting, these factors relate to which year in school a student is, length of time to complete a task and complexity of task, and vary with the academic domain. Elementary, middle school, and high school students are different in their capabilities. High school students enter the college experience with different social, educational, and personal pressures and expectations. Perseverance for each group is

different, as cognitive skills differ and require greater complexity in the latter years to provide meaningful challenges. Academic content is also considered. Appropriate domain and complexity to encourage and not undermine students' goals are necessary to build a student's ability to persist.

Students learn personal industriousness when their efforts are rewarded. This can become an intrinsic motivation, as self-esteem is associated with perseverance. The risk of performing poorly or of failure in front of others is an internal motivation that drives many students. Self-efficacy is associated positively with perseverance and preserving, as it drives people to keep on course and in control of their tasks. A high internal locus of control supports a student's actions to control his or her fate and be persistent (Lufi & Cohen, 1987).

Personality factors and ability also influence perseverance. High expectations and ability lead to higher perseverance. Students who are competent in a subject have received rewards for their effort, and believe the subject is relative and meaningful to them are more likely to maintain effort (Peterson, 2004) (Peterson, 2004). Intelligence and abstract-thinking skills are linked to perseverance in adolescents. Personality traits such as self-discipline, emotional stability, and competitiveness were found to relate in adolescents (McGiboney & Carter, 1993).

Students who show confidence tend to interact more in the classroom, grow more outside of the academic setting, and are more likely to develop further in intellectual standings. Interior design students who place higher on Perry's scheme performed better in studio compared to students in beginning or intermediate studio with lower

performance and were in the Dualism in Perry's Scheme of Intellectual Development (Carmel-Gilfilen & Portillo, 2010).

### *Perseverance*

Perseverance is one trait fundamental to creativity; curiosity is the other (Csikszentmihalyi, 1996). Perseverance is necessary for achieving goals set in education, business, and personal life. Perseverance is a specific trait needed to be a successful interior design student. Extrinsically motivated perseverance and knowing how and when to be persistent are skills fostered in an academic setting by instructors and course work using appropriate rewards, similar to training a student in a vocation. To be persistent, a drive from within may be an inherent trait, based on a certain mind-set or belief, intrinsic motivation for self-direction, or a combination of each.

Perseverance, as categorized in *Character Strengths and Virtues* (Peterson, 2004), is a strength listed as component of the virtue of courage. *Character Strengths and Virtues* is a classification system used in the study of positive psychology, which lists and describes six core virtues that are found across cultures and have been consistent throughout time. The classification is similar in structure to the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2013), but lists positive strengths and attributes. Referred to as the "Manual of the Sanities" for this reason, this system provides a model for research in positive qualities of character strength. The six core virtues are wisdom and knowledge, courage, humanity, justice, temperance, and transcendence (Peterson, 2004).

The ability to maintain effort to attain a goal has benefits beyond the goal itself. Perseverance increases the chance to attain the goal, brings enjoyment through success,

increases skills, and can increase self-efficacy in a student (Peterson, 2004). Increasing and improving skills leads to more opportunities and offers more potential to build on the benefits.

There may even be a down side to perseverance. Not knowing when to stop in a task that is unattainable or has undesirable consequences are outcomes to be identified as early as possible. Knowing when to cut your losses and move on is a different discussion from this paper. Selecting a goal and striving for completion is applicable to this paper, and the dependent variable in this study.

Perseverance and persistence are used interchangeably by many researchers (Peterson, 2004). Although Peterson prefers persistence, perseverance is used in this paper because of its use by Dr. Angela Duckworth in her definition of grit. Duckworth researches personality traits involving strategies of self-control and grit related to overcoming obstacles and attaining goals. She is responsible for the tool for measuring grit used in this study (Pennsylvania, 2014).

A person's perseverance must be greater than the obstacle to overcome. Peterson and Seligman separate perseverance into two categories: active perseverance and belief perseverance. Active perseverance is the un-coerced participation toward achieving a goal, even in the face of difficulties. "I have proven my abilities and will continue to apply them to overcome an obstacle" is active perseverance. Belief perseverance, sometimes called attitudinal perseverance, is continuing to believe in an idea, or attitude that differs from contradictory evidence (Peterson, 2004). Rejection of the Pythagorean or evolutionary theories because you do not "believe" in them falls into this category. Peterson and Seligman dismiss belief perseverance in their study of character because it

is not voluntary or active in nature (2004). This may need to be reconsidered, as there are examples, both historical and modern, to support the physical manifestation of attitudinal perseverance. Understanding the drive that guides people, whether by belief or experience may be important to acknowledge, as actions based on beliefs have results and consequences, too.

It is important to note that someone is not considered to persevere if the task can be accomplished quickly or is considered easy. To be persistent or persevere at a task or goal, the task is required to be difficult, complex, or out of reach.

Peterson and Seligman's book, *Character Strengths and Virtues* (2004), places (persistence) perseverance under the category of courage, the emotional strength to complete tasks, even with obstacles to its completion. They define perseverance, similar to Duckworth's definition of perseverance and passion for long-term goals, as goal directed action in spite of obstacles.

What allows students to be and remain persistent at the college level? What do intellectual development and drive to finish college (academic perseverance) have in common? Academic ability prior to college (high school Grade Point Average (GPA)), parents' education level, family emotional support, financial aid, motivation, and sex are variables that Dr. David Allen studied in relation to finishing college (1999). Allen also noted that it would be incorrect to assume that incoming first-time freshmen are motivated to complete college. Attrition rates were lower for those students who were better prepared academically and were highly motivated prior to starting college, and whose parents had achieved a higher level of education. Allen found GPA for minorities and non-minorities had a direct effect on academic perseverance (completing college).

### *Factors Influencing Perseverance*

Many factors influence incoming students. External sources that influence the ability to persist range from socio-economic background, parental support, the student's belief in his or her own abilities, and how students fit into and accept the college setting. Motivation seems to drive perseverance (Peterson, 2004). Extrinsic and intrinsic motivation have different outcomes and longevity of influence over a student.

Extrinsic motivation that drives perseverance is structured into business and classroom settings. Salespeople are enticed with awards and bonuses, and those who work on commission have tremendous motivation to persevere in attaining sales goals. Grades and awards bolster a student's self-worth and are ways to gauge and measure perseverance. Salespeople and students who receive special acknowledgements or rewards are more likely to be persistent than those who do not.

Intrinsic motivation factors support the internal drive to persist and succeed. Academic settings build up students' self-efficacy—students' belief that they have control and mastery in a subject and can take on challenges with a positive outlook—are more likely to enhance persistence than those who do not (US Dept. of Education, 2013).

Paul Tough cites Angela Duckworth when introducing motivation in the second chapter of *How Children Learn* (2012). Motivation without volition is not sufficient to complete goals. It is the combination of self-control (will power) and motivation that is essential to reach the desired goal or the ability to maintain conscientiousness and follow through (grit) until completion of an assignment. Neither alone is sufficient. Students need to remain persistent in order to achieve their goals. Motivation and perseverance are not the same, in many cases: Perseverance, or Duckworth's Grit, requires a deeper

understanding of a situation or a unique approach to a solution. This may include the student's source of knowledge, or trust in the source as it supports the student's effort.

### *Big Five Model and Five-Factor Theory of Personality Traits*

Duckworth found that perseverance and conscientiousness in the Big Five Model are highly correlated. The Big Five Model, also known as the Five-Factor Model, is a descriptive taxonomy of personality traits of personality psychology (Srivastava, 2014). The initial study by Gordon Allport and Henry Odbert parsed out adjectives from unabridged dictionaries referring to personality traits. This list of adjectives was then further refined into common categories developing into the taxonomy. Others have used Allport and Odbert's work, modifying and building upon the initial taxonomy (Peterson, 2004). The five non-redundant and mutually independent factors are identified as Surgency or Extroversion, Agreeableness, Culture, Emotional Stability, and Conscientiousness or Dependability (Goldberg, 1990).

One dilemma with the original model was that it was based on classification of words that describe personality traits but not on the actions associated with them (Peterson, 2004). The Five-Factor Theory of Personality Traits (McCrae, 1999) uses the Five-factor Model (FFM) as the basis for trait theory. Individuals can be described and classified through their actions, thoughts, and feelings in a similar system, and the FFM can be used for describing people, for these personality traits exist as the lexicon for personality traits and that personality traits exist in individuals (see Table 2).

Table 2  
*Five-Factor Theory of Personality Traits*

Personality Factors	Associated traits
Extraversion or Surgency	Sociability, energetic, talkative, assertive, outgoing.
Agreeableness	Sympathetic, modesty, trusting and forgiving, altruistic, compassionate.
Openness ,Culture, or Intelligence	Artistic, curious, open to new ideas and experiences, having an active imagination.
Neuroticism or Emotional Stability	Moodiness, anxiousness, self-confidence, discontentment.
Conscientiousness or Dependability	Organized, thoroughness, capability, self-disciplined, dependable.

Extroversion or surgency describes a person's outgoing nature and assertiveness. Agreeableness traits relate to compassion and trust in people. Openness by McCrea and Costa (1987) (Goldberg, 1990) is identified as Intelligence by Digman and Takemoto-Chock (1981) and Peabody and Goldberg (1989) or as Culture by Goldberg (1990). This trait includes insightfulness and the willingness to explore. Neuroticism or emotional stability are traits described using terms such as moodiness or tension. Conscientiousness or dependability traits include the ability to plan and organize. Related to surgency or extroversion are self-efficacy and motivation. A higher level of self-confidence may influence personal goals.

#### *Other Studies Related to Perseverance*

Graham and Wiener's Theories and Principles of Motivation denote a sequence to study and describe motivation as: Choice of behavior, latency, intensity, perseverance, and emotional reactions to the behavior. Within this sequence is perseverance, which is measured as the time length or duration a person is willing to maintain the activity or action (Graham, 1996). This is closely related to Duckworth's definition.

### *Grit*

Duckworth et al. developed their own independent tool, the Grit Scale, which met their criteria: Psychometric soundness and face validity for adolescents and adults, low likelihood of a ceiling effect of high-achieving populations, and a precise fit to their definition of grit. Their quest for a measurement tool that included these four specific items in its criteria was unsuccessful. There were self-reporting tools directed towards adults or toward adolescents, but not both. Other measurement tools that identified work ethic or desire for excellence also included qualities that were not relevant to their definition, and were rejected as well.

The Grit Scale is a tool that describes, in numerical format, how a person views his or her ability to persevere. What makes a person successful or provides the drive to complete a task? How can self-control be maintained over the long term to attain goals? Ability, IQ, knowledge, and talent all are important to success, but tireless determination and perseverance accounts for much success, more than other aspects of intelligence or other non-cognitive skills. This unrelenting effort over time to achieve a goal has been compared to completing a marathon. Although intelligence is important, it is not the key to success. Dogged stamina in an area of interest was more indicative of success than were other personality traits (Duckworth, 2007).

### *Grit Scale*

Duckworth et al. developed this instrument to meet the criteria for both adults and adolescents and to take into account behavioral traits and attitudes that describe individuals prominent in their fields. In addition to the original criteria, questions directed to any specific field or domain, were not included. The questions regarding perseverance

were tailored for responses on sustained effort, and not for those who remained at a task out of fear of change, compliancy, or were not aware of other courses of action.

Considered in the development of the 12-question Grit Scale are the two factors of sustained interest and the effort to attain a goal. These two factors were shown to be consistent in predicting perseverance, and even more so together better than individually (Duckworth, 2007).

The 12-question Grit Scale was administered in six separate studies. These included studies regarding age and educational level, the Big Five traits, GPA, retention of military candidates during their first summer of training and Whole Candidate Score at the United States Military Academy (West Point), and the 2005 Scripps National Spelling Bee.

Study one looked at age and education. The results confirmed that adults with more education had more grit than those of the same age with less education. However, a two-way analysis was run to determine the differences in grit, and education and age. Grit levels for age did not vary with education, and grit levels for educational level did not vary with age. Age may have other mitigating factors that influence the ratings. Younger people may be more prone to change, pursuing activities with greater promise, and the age when people begin raising families may plateau grit, as certain traits are not beneficial to raising a family, and grit may be influenced by peers within the age groups with the expectation of older people being more successful. Duckworth cites Ericsson and Charness (1994) that becoming proficient at an activity takes time.

Study two investigated the relation between grit and conscientious in the Big Five Theory of Personality Traits. The correlation ( $r=.77$ ) was 39 percentage points higher

than the next highest correlation, Neuroticism. This indicated a positive correlation between grit and conscientious.

Study three researched the relation between grit and GPA. The study demonstrated that high grit scores and GPA have a relationship, SAT scores being equal. There was an interesting finding to this study that suggests students with lower SAT scores may be slightly grittier than the students with higher SAT scores, working harder than their fellow students to achieve higher GPAs.

Studies four and five were conducted at the United States Military Academy at West Point. Grit was a better indicator for retention after summer training than the Academy's previous measurement tools. Grit demonstrated that the rigors of the training tested the limits of the cadets' physical, emotional, and mental capabilities.

Study six, also known as the Spelling Bee Study, noted that the grittier competitors not only studied, but actively determined their own weaknesses and then pursued rigorous study in those areas. Deliberate practice, differing from leisure reading or quizzes, involved greater effort and was less enjoyable. Deliberate practice and commitment to longer hours of practice explained the competitors' superior performance over the other spelling competitors.

By testing the Grit Scale in these studies, Duckworth et al. concluded that grit accounted for success more than did IQ or the Conscientiousness in the Five Factor Model. Grit also may increase with age. Grittier people tend to stay longer in a career, compared to peers of equivalent age. Even with lower SATs students with higher grit scores earned higher GPAs than did other students. Grit, the ability to remain committed

to an outcome, was the leading indicator in success, and is better at predicting success than is IQ.

#### *The Short Grit Scale Development*

The Short Grit Scale was developed by Duckworth and Quinn in 2009 for a better measure of grit. From the original Grit scale, the two factors of sustained effort and perseverance in an effort were tested with individual outcomes to determine if any difference in prediction was more reliable than the other. During the research, two statements from each factor category were found to be regularly less than the median of prediction. Through a series of five tests, the more efficient Short Grit was developed. Results confirmed many of the findings from the first grit study, but with greater validity.

## CHAPTER THREE: METHODOLOGY

The design of this study seeks to determine if Perry's Scheme of Intellectual Development influences Duckworth's Short Grit Scale. Population of potential participants and a brief demographic description are discussed in this chapter. The research design, instruments, and the procedures of the study are discussed as well, with a brief discussion of the data.

### *Setting and Sample Population*

The setting for this study is the University of Minnesota, College of Design, Interior Design Program, a four-year baccalaureate degree, accredited by the Council for Interior Design Accreditation (CIDA). The majority student body for this program consists of young women ages 18 to 22. Most are middle-class and mainly from Minnesota and the surrounding five state area (University of Minnesota, 2012). This pool of potential participants is common to other state university systems for interior design.

A convenience sample was drawn from students in Interior Design Studio II (IDES 1602) class in the spring of 2014. All individuals in the class were offered a reward of ice cream, whether or not they participated in the study. This offer was made so every student felt there would be no retaliation for not participating.

### *Research Design*

This study uses Perry's Scheme of Intellectual and Ethical Development as the independent variable to seek an association between intellectual development and perseverance. There are two main reasons for doing so. The first is that Perry's Scheme of Intellectual and Ethical Development assigns a descriptor to the participant that parses out the nature of truth, identifies the source of knowledge, and associates this with stages

of development. The other dominant reason is that others have used Perry's Scheme of Intellectual and Ethical Development to study how college students receive and process knowledge. *Women's Ways of Knowing* (Belenky, 1986) and *Knowing and Reasoning in College* (Baxter Magolda, 1992) both acknowledge Perry as an avenue to study how young adults process information.

Angela Duckworth's Short Grit Survey (dependent variable) was plotted in relation to the students' placement along Perry's Scheme (independent variable). Data was collected, the information compiled, and statistical analysis applied. Correlation and ANOVA analysis was used to determine the relationship between a student's MID score and Short Grit score. In this study, a p-value greater than .010 rejected the null hypothesis.

#### *Measurement Tools*

The measurement tools used in this study are Perry's Scheme of Intellectual and Ethical Development and Duckworth's Short Grit Scale. The continuum of intellectual development progresses from dualism, where there are only right and wrong answers, through a series of exceptions and explorations of multiple answers leading to the learning process itself as transformational in the student's identity as the source of knowledge (Moore, 1994). As noted by Duckworth, et al. (2007), intelligence and talent are not the defining traits in success for long-term goals. By using these two instruments in tandem, research may be able to determine if the stages of intellectual development and commitment to a subject are at the highest levels, and use this information for instruction of students.

*Instruments: Model for Intellectual Development (MID), Perry's Scheme Position*

*Determination and Reporting*

The participants supplied a written response to a predetermined question. Once the students completed the MID essays, they were sent to Dr. William Moore, at the Center for the Study of Intellectual Development (CSID). The essays were reviewed and rated for themes of meta-thinking by trained personnel with extensive knowledge of both Perry's Scheme and the rating process developed by L.L. Knefelkamp and the CSID. One or two raters, depending on the investigator requesting the review, may review each student's essay. This study requested only one rater to review the essays for time and budget reasons. Having two trained raters for inter-rater reliability is suggested. If two raters disagree, a third rater is consulted, and a determination is reached. The ratings of the essays range from Position 2 to Position 5. Position 1 is a hypothetical extension of scheme and not used in the reporting.

MID ratings are composed of a three number sequence that describes the student's position along Perry's scheme. 222,333,444, and 555 all indicate a solid placement in the position. Numbers that lead or follow indicate a trailing position (233, Position 3 with trailing Position 2) or indicate an opening into the next (334, Position 3 opening to Position 4).

Information from the CSID is used to convert MID data for statistical analysis. To convert raw MID into continuous data, use Table 3. For grouping the position into categorical data, use Table 4. Continuous data, Table 3, is used in this study.

Table 3  
*Continuous Data Conversion*

MID Score	Conversion
222 & 222(3)	2.0
223	2.33
233	2.67
333 & 333(4)	3.0
334	3.33
344	3.67
444 & 444(5)	4.0
445	4.33
455	4.67
555	5.0

Table 4  
*Categorical Data Groupings*

MID Score	Conversion
222 & 222(3)	Position 2
223 & 233	Transition 2/3
333 & 333(4)	Position 3
334 & 344	Transition $\frac{3}{4}$
444 & 444(5)	Position 4
445 & 455	Transition 4/5
555	Position 5

When converting data for use in statistical analysis, the MID score is converted to the numeric rankings as shown in Tables 3 or categorical ranking in Table 4. Any additional symbols or comments are removed before making the conversion. For example, using, 444 *early*, or 333+, the *early* comment and the + would be removed.

These are comments or indicators that raters may add to the position descriptor. A + or – to indicate the rater(s) may reason that another rating may apply. *Early* or *Glimpse* indicate that a rating may be early into the position, or from a position a glimpse into the next position. 333 *early* indicates a rating bordering on 333 from 233. 333 *glimpse* or

333(4) indicates a solid Position 3 bordering on Position 4. A 2/4 or 3/5 split comment indicates a split between the two positions, where characteristics of both Position 2 and Position 4 are recognized. These are difficult for the raters to determine, and may require additional review (Moore, 1984).

#### *Instruments: Short Grit*

The Short Grit Scale ranks participants on a scale of one to five. In the Short Grit Survey, eight questions are asked with predetermined responses assigned a point value. These are tallied up and averaged to produce the Short Grit Score. The higher the rating, the greater the level of Grit the student has.

#### *Data Collection*

Short Grit surveys were administered either during first-year orientation or prior to the MID essay. All incoming interior design students present at Welcome Week orientation were given the opportunity to take the self-reporting Short Grit survey. These surveys did not have the scoring system attached to the form, so as not to influence the student's responses. Students who were administered the Short Grit during orientation were matched with either his or her name or X500 number.

Prior to the essay, volunteers were explained the purpose of the study, how their information would be used and that the information would remain confidential, and that they could withdraw from the study at any time. The MID Essay A was administered by the researcher. This essay is an open-ended question and prompts the students to explain a past learning experience. Students are encouraged to offer their opinion and write as much as they deem necessary to respond to the prompt. Each student was reminded that there was no right or wrong answer, and that the answers would remain confidential.

Participating students were asked not to discuss the essay with others until after the researcher had completed the data gathering, to prevent potential participants from preparing beforehand, or somehow altering their response.

Dr. William Moore of the CSID coordinated the evaluation of each essay and provided the data to the researcher. This is standard procedure for administering and evaluating the MID. The researcher, for continuity, scored both groups of students who took the Short Grit at orientation or the time of the MID essay.

### *Data Analysis*

The researcher, using IBM SPSS Version 22, analyzed the potential relation between the two variables. ANOVA and correlation analysis were run to determine any relation. MID scores were determined by Dr. William Moore at the CSID, and returned to the researcher. The Short Grit Scores were tabulated by the researcher and associated with the appropriate student's MID score. All personal information was then stripped from the data so that only the MID and Short Grit score remained in the data set. The researcher then added a new student identifier to aid in discussing specific student score relationships.

### *Basic Assumptions of Study*

- The procedure was an appropriate method to collect data.
- Self-reporting with no prior prompts or comparison for both the MID or Short Grit survey would lead to answers that are more honest from participants.
- Tools are reliable in gathering data.

- A p-value of .010 was used for study to lessen the chance that borderline responses would not be included.

#### *Limitations of the Study*

- The low number of participants (n=15) in this study does not supply sufficient data for statistical review.
- Second semester students completed the MID essay, not first semester students.
- Approximately 12% of first year, first semester students did not continue into the second semester of the program, and were therefore not included in study.
- Self-reported survey and essays may be skewed by the student, as participant may have offered a “correct answer” instead of his or her honest opinion.
- Short Grit responses may have been inflated by participant as an aspiration rather than actual actions.
- Both MID and Short Grit Scores can vary between individuals based on emotional state of the participant while completing each.
- The participant's MID Score did not extend into Positions 5 or higher.

## CHAPTER FOUR: FINDINGS, ANALYSIS, AND DISCUSSION

The purpose of this study was to determine whether there is a relation between interior design students' intellectual development and their persistence. The hypotheses to be tested are;  $H_0$  = There *is no* relation between a student's MID and Short Grit Score, and  $H_1$  = There *is a* relation between a student's MID and Short Grit Score. Two instruments are employed to measure each variable: the Measure of Intellectual Development (MID) as the independent variable and the Short Grit Scale as the dependent variable (see Table 5).

*Data Analysis and Results*

Table 5  
*Study Data*

Student	Continual MID	S-Grit Score
A	2.33	3.875
B	2.67	3.750
C	2.67	4.000
D	2.67	3.350
E	3.00	3.650
F	3.00	3.250
G	3.00	4.250
H	3.00	3.375
I	3.00	3.000
J	3.33	3.500
K	3.33	2.620
L	3.33	4.000
M	3.67	3.750
N	3.67	3.250
O	3.67	3.375

The information in Table 5 has all personal identification removed. The letter assigned to the student is a descriptor and used for discussion purposes only.

*Descriptive Statistics*

The mean MID Score (see Table 6) for the participants is 3.08, placing the average along the Perry Scheme in Position 3, using Table 4 to convert the continual date to position placement. As explained in Chapter Two, this position occurs when there is a conflict between multiple authorities that the student finds reliable. Still looking for the correct answer, students believe there is a correct way to find an answer. They believe that hard work will provide the answer. Dualism (correct and incorrect answer) is still significant, but lessens as the students realize that they need to use their own thought to solve the problem.

Position 4 is reached when the student concludes that hard work is not enough, and that independent thought is required. The average for this study does not fall within this position. Three students' MID Scores are 3.67. Converting this to 344 places them along Perry's Scheme as transitioning from Position 3 toward, but not fully into, Position 4.

Average Short Grit Score is 3.52 (see Table 6). Short Grit Scores range from 1 to 5, 1 indicating not very gritty to 5, extremely gritty. The average score of 3.52 indicates the participants are grittier than most, but not the grittiest.

Table 6

*Descriptive Statistics*

	N	Minimum	Maximum	Mean	Std. Deviation
MID	15	2.330	3.670	3.08933	.407895
Short Grit	15	2.620	4.250	3.52633	.429566
Valid N (listwise)	15				

*Data Analysis and Results*

Using SPSS, ANOVA is determined (see Table 7). The null hypothesis ( $H_0$ ) for this study was not rejected, there is no relation between a student's placements along Perry's Scheme of Intellectual and Ethical Development and his or her Short Grit score. The significance (p-value) determined using SPSS is .33, indicating that chance was more likely to determine the outcome. Even allowing for a lower probability threshold of 90% ( $p < .10$ ) the findings did not fall within the tolerances.

Table 7  
ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.187	1	.187	1.017	.332 <sup>b</sup>
	Residual	2.396	13	.184		
	Total	2.583	14			

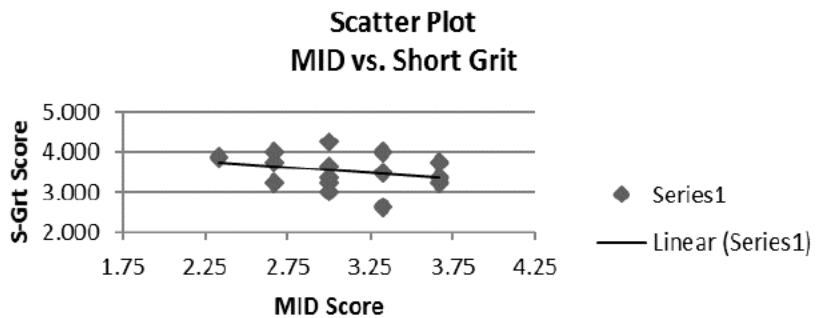
- a. Dependent Variable: Short Grit  
b. Predictors: (Constant), MID

A correlation value of  $-.2692$  indicates a weak negative correlation between an interior design student's position along Perry's Scheme of Intellectual and Ethical Development and their Short Grit Score (see Table 8). The Scatter Plot Diagram (see Table 9) graphically shows this relationship.

Table 8  
*Correlations*

		MID	Short Grit
MID	Pearson Correlation	1	-.269
	Sig. (2-tailed)		.332
	N	15	15
Short Grit	Pearson Correlation	-.269	1
	Sig. (2-tailed)	.332	
	N	15	15

Table 9  
*Scatter Plot Graph*



*Discussion*

Due to the limitations to this study, findings are not conclusive. The two most important limitations are the number of participants (n=15); the pool of participants contained no first semester students.

## CHAPTER FIVE: SUMMARY, CONCLUSION, AND IMPLICATIONS

*Summary*

The purpose of this study, using first year interior design students at the University of Minnesota, is to seek any relationship between Perry's Scheme of Intellectual Development and Duckworth's Short Grit Scale. First year interior design students have many hurdles to overcome as new college students; results from this study indicate there is no significant statistical relation ( $p$ -value = .33) between the two variables and only a weak correlation (-.26) at best between Perry's Scheme of Intellectual and Ethical Development and Duckworth's Short Grit Scale for first year second semester students. Allowing for a lower tolerance of 90% ( $p$ -value = .10) would not have swayed the results or offered a different explanation for the findings. In this study, findings indicate that the null hypothesis is not rejected for interior design students who have completed the first semester of the first year in the interior design program.

There were corrections and obstacles to this study that will need to be addressed in order to offer a more accurate conclusion. As noted in Chapter Three, the population of participants was limited to first year, first semester incoming students; this study used second semester students. The students who are missing in this study are those who did not complete the first semester or continue on to the second semester in the interior design program. Without the six students who did not move forward to second-semester, the opportunity to include this group was lost. Information from this study sample cannot be generalized to the interior design population as a whole.

The number of participants was insufficient for a meaningful study ( $n=15$ ). Students will need to be recruited in order to reach a study population that supports statistical

analysis. A more rewarding enticement, perhaps of a gift card to a local retailer, entertainment venue, or the like may be necessary to entice a sufficient number of participants.

### *Conclusions, and Implications*

To conclude that the results of this study are sufficient and useful would not be accurate. As a study, it has been an exercise in identifying areas for shortcomings and in identifying potential solutions to the study.

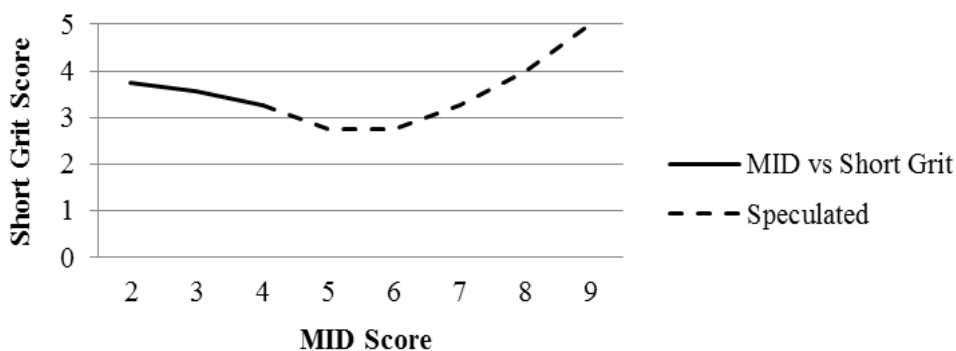
Recommendations for further research in this area of interest include: expanding the potential pool of interior design participants by including students from other area colleges and universities, and capturing data within the first week of class, expanding the study over the length of a student's college career.

Expanding the pool to other schools' interior design programs will add participants, and may offer greater variation in the MID and Short Grit scores. Capturing data the first week is appropriate for the study. This will provide the most accurate data to track the selected population.

Following students through a longitudinal study will offer a broader time period for understanding what source of knowledge a student draws upon to work through design problems. Assessing students over their four years may also lead to a wider variation of positions along Perry's Scheme of Intellectual and Ethical Development and may show a change in perseverance. The longitudinal study may offer insight as to when the students advance or temporize (delay) in intellectual development, or help identify what triggered the temporizing. Temporizing may be a realization that the student is not ready to advance in intellectual development, by either the student or instructor.

In the Speculative Relationship Graph (see Table 10), the relationship between Perry’s Scheme of Intellectual Development and Duckworth’s Short Grit Score is illustrated in theory. The initial (solid line) is mimicking the study findings. During Positions 5 of Contextual Relativism, students may experience the most frustration approaching solutions. The student may identify many “correct answers” but be unsure of the best approach to solving the design problem. Escape or retreat can be experienced during this position along Perry’s Scheme of Intellectual Development, and may lead to a drop in persistence. Students at this point in their intellectual development may have the greatest difficulty in determining approaches to design problems and be confused as to what is the appropriate approach and solution.

Table 10  
*Speculative Relationship Graph*



The speculated portion of the graph is based on Perry’s Scheme of Intellectual Development (see Table 1) and belief perseverance turned active perseverance as described in *Character Strengths and Virtues*.

The definition used in this study for perseverance is completing a course of action in spite of obstacles. This assumes a voluntary response to overcome obstacles or setbacks during complete a task or assignment. Belief persistence, sometimes called attitude perseverance, is maintaining a belief even when faced with contradictory information (Peterson, 2004). This definition fits with Dualism (Positions 1&2) in Perry's Scheme of Intellectual Development, where only one authority exists, and right or wrong is understood as the correct approach to a problem. "The instructor said this is the way to do it" is a belief persistence statement, and the student will continue to approach design problems using this approach until a solutions is reached.

Commitment within Relativism (Positions 7, 8, & 9) makes possible the best answer based on all the information being weighed. Students make a commitment based on ethical considerations and context to be perseverant in solving a problem. This requires commitment and active participation in the problem. Both forms of perseverance provide for follow though in solving problems.

Using this information in educational settings would be useful in many aspects of instruction of interior designers, i.e. helping to retain students and assist faculty to guide students in acquiring critical thinking as part of the design skills taught in the curriculum.

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## Appendix A

*Short Grit Scale Survey (Duckworth A.,2012)*

Directions for taking the Grit Scale: Please respond to the following eight items. Be honest – there are no right or wrong answers!

1. New ideas and projects sometimes distract me from previous ones.\*
  - . Very much like me
  - . Mostly like me
  - . Somewhat like me
  - . Not much like me
  - . Not like me at all
  
2. Setbacks don't discourage me.
  - . Very much like me
  - . Mostly like me
  - . Somewhat like me
  - . Not much like me
  - . Not like me at all
  
3. I have been obsessed with a certain idea or project for a short time but later lost interest.\*
  - . Very much like me
  - . Mostly like me
  - . Somewhat like me
  - . Not much like me
  - . Not like me at all
  
4. I am a hard worker.
  - . Very much like me
  - . Mostly like me
  - . Somewhat like me
  - . Not much like me
  - . Not like me at all
  
5. I often set a goal but later choose to pursue a different one.\*
  - . Very much like me
  - . Mostly like me
  - . Somewhat like me
  - . Not much like me
  - . Not like me at all

6. I have difficulty maintaining my focus on projects that take more than a few months to complete.\*

- . Very much like me
- . Mostly like me
- . Somewhat like me
- . Not much like me
- . Not like me at all

7. I finish whatever I begin.

- . Very much like me
- . Mostly like me
- . Somewhat like me
- . Not much like me
- . Not like me at all

8. I am diligent.

- . Very much like me
- . Mostly like me
- . Somewhat like me
- . Not much like me
- . Not like me at all

Scoring:

1. For questions 2, 4, 7 and 8 assign the following points:

- 5 = Very much like me
- 4 = Mostly like me
- 3 = Somewhat like me
- 2 = Not much like me
- 1 = Not like me at all

2. For questions 1, 3, 5 and 6 assign the following points:

- 1 = Very much like me
- 2 = Mostly like me
- 3 = Somewhat like me
- 4 = Not much like me
- 5 = Not like me at all

Add up all the points and divide by 8. The maximum score on this scale is 5 (extremely gritty), and the lowest score on this scale is 1 (not at all gritty)

## Appendix B

*Measure of Intellectual Development***MID ESSAY COVER SHEET**

The attached essay asks you to describe what you believe to be the most significant aspects of your learning in different settings. Instructions are provided at the top of the essay page; please respond to the directions in the space provided, using the back of the sheet if necessary.

There are no right or wrong responses; what is most important is that you present clearly the way you think about the specific aspects of the course or learning environment you describe. Your opinions are very important to us as we study how students think about teaching and learning issues, so we ask that you take this task seriously and give your responses some careful thought. We appreciate your cooperation in sharing what you find most important in your own learning.

Before responding to the essay, please provide us with the basic information below. Such information is helpful to us in identifying different perspectives among different groups of people and will be held in strict confidence. At no time will any information be used to identify you as an individual, although in some cases your code or Social Security number may be used to allow for a follow-up contact with you in the future.

**NAME** (optional): \_\_\_\_\_ **DATE:** \_\_\_\_\_

**SOCIAL SECURITY NO.** (or Student ID): \_\_\_\_\_

**SEX** (check one): Male \_\_\_ Female \_\_\_ **AGE:** \_\_\_\_\_

**ETHNIC HERITAGE:** (optional)

\_\_\_\_\_

**EDUCATIONAL LEVEL** (check one):

Fr \_\_\_ Soph. \_\_\_ Jr. \_\_\_ Sr. \_\_\_ Grad \_\_\_ Other \_\_\_

**MAJOR** (If undeclared, please indicate): \_\_\_\_\_

**CURRENT GPA:** \_\_\_\_\_

*ESSAY A (Knefelkamp & Widick, 1974)*

Describe the best course you've experienced in your education. What made it positive for you? Feel free to provide as much detail as you think is necessary to give a clear idea of the course. For example, you might want to discuss areas such as the subject matter, class activities (readings, films, etc.), what the teacher was like, the atmosphere of the class, the evaluation procedures--whatever you think was most important in making this experience so positive for you. Please be as specific as possible in your response, describing as completely as you can why the issues you discuss stand out as significant to you.

Table 1.

*Positions of Perry's Scheme of Intellectual and Ethical Development*

Position	Possible answers	Source of knowledge or authority.	Student's relation to authority.	
Dualism Positions 1&2	Right and wrong Black and white Only one correct answer, yes or no.	Authority has absolute truth. Only one authority for a subject. "My dad has the only right answer, your dad is just wrong."	Student receives knowledge.	1- There is only one authority. 2- The second authority is wrong, not the answer given by the authority.
Multiplicity Positions 3&4	Third option to an answer, yet unknown.	Conflict between multiple "good" authorities.	3-Student seeks one true answer. 4-Hard work is not enough, independent thought required.	3- "If I just work hard, I'll get to the right answer." 4- Becomes aware of ownership of answer, but lacks context so all answers are arbitrary. "It's all arbitrary to me."
Contextual Relativism Positions 5&6	Multiple answers.	5- Can be chaotic not knowing best approach to solve problems. 6- Becomes imparter of knowledge.	Student becomes source of knowledge and answer.	5- Multitude of correct answers based on context.  6- Problem solving requires defining rules to process correct answer.
Commitment within Relativism Positions 7,8&9	There may not be a correct answer.	Commitment based on ethics to sort out difficult and sometime contradicting information.		7, 8- Best answer based on weighing all information.  9- There may not be a best answer, but will remain persistent to attain.

Table 2.  
*Five-Factor Theory of Personality Traits*

Personality Factors	Associated traits
Extraversion or Surgency	Sociability, energetic, talkative, assertive, outgoing.
Agreeableness	Sympathetic, modesty, trusting and forgiving, altruistic, compassionate.
Openness ,Culture, or Intelligence	Artistic, curious, open to new ideas and experiences, having an active imagination.
Neuroticism or Emotional Stability	Moodiness, anxiousness, self-confidence, discontentment.
Conscientiousness or Dependability	Organized, thoroughness, capability, self-disciplined, dependable.

Table 3  
*Continuous Data Conversion*

MID Score	Conversion
222 & 222(3)	2.0
223	2.33
233	2.67
333 & 333(4)	3.0
334	3.33
344	3.67
444 & 444(5)	4.0
445	4.33
455	4.67
555	5.0

Table 4  
*Categorical Data Groupings*

MID Score	Conversion
222 & 222(3)	Position 2
223 & 233	Transition 2/3
333 & 333(4)	Position 3
334 & 344	Transition $\frac{3}{4}$
444 & 444(5)	Position 4
445 & 455	Transition 4/5
555	Position 5

Table 5  
*Study Data*

Student	Continual MID	S-Grit Score
A	2.33	3.875
B	2.67	3.750
C	2.67	4.000
D	2.67	3.350
E	3.00	3.650
F	3.00	3.250
G	3.00	4.250
H	3.00	3.375
I	3.00	3.000
J	3.33	3.500
K	3.33	2.620
L	3.33	4.000
M	3.67	3.750
N	3.67	3.250
O	3.67	3.375

The information in Table 5 has all personal identification removed. The letter assigned to the student is a descriptor and used for discussion purposes only.

Table 6  
*Descriptive Statistics*

	N	Minimum	Maximum	Mean	Std. Deviation
MID	15	2.330	3.670	3.08933	.407895
Short Grit	15	2.620	4.250	3.52633	.429566
Valid N (listwise)	15				

Table 7  
*ANOVA*<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.187	1	.187	1.017	.332 <sup>b</sup>
	Residual	2.396	13	.184		
	Total	2.583	14			

- a. Dependent Variable: Short Grit  
b. Predictors: (Constant), MID

Table 8  
*Correlations*

		MID	Short Grit
MID	Pearson Correlation	1	-.269
	Sig. (2-tailed)		.332
	N	15	15
Short Grit	Pearson Correlation	-.269	1
	Sig. (2-tailed)	.332	
	N	15	15

Table 9  
Scatter Plot Graph

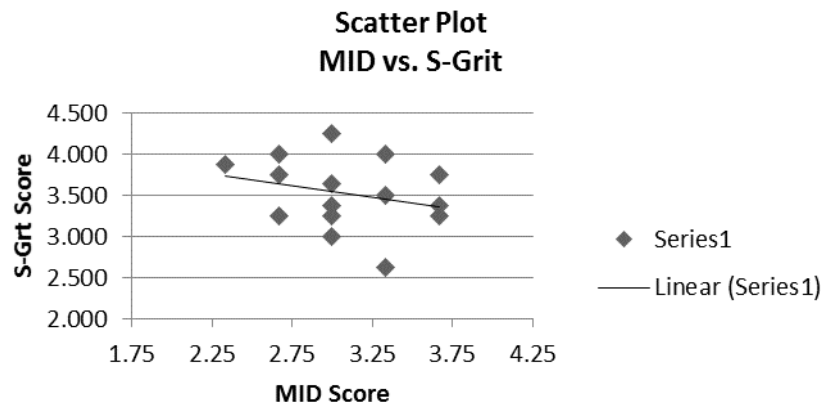


Table 10  
*Speculative Relationship Graph*

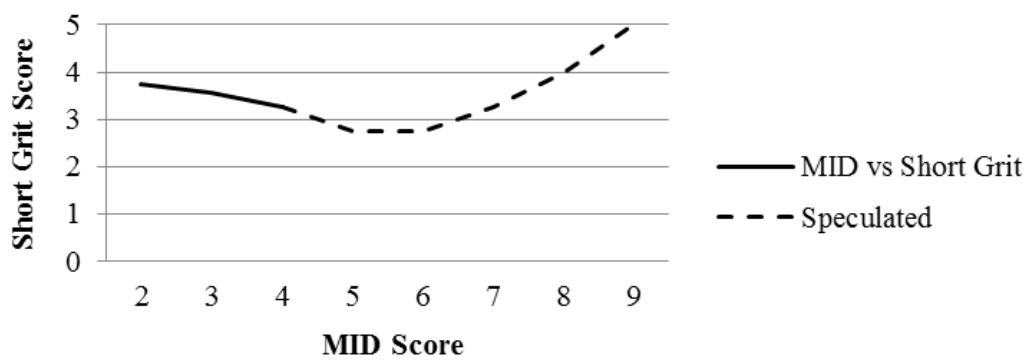


Figure Captions

Figure 1. Research proposal diagram

