

The Gritty Mind Stays Focused While Other Minds Wander When Lectures Are Of Low
Interest

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Abstract

Although researches suggest that mind wandering typically comes with cost, very limited work has explored the potential correlates of mind wandering in the classroom context. In the present study, we suggested that grade point average, course interest, seating position, academic performances (GPA) and grit, would be correlated with mind wandering frequency. We tested these hypotheses by measuring the frequency of mind wandering using a probe-caught method among forty-six undergraduate psychology students. Results suggested that both GPA and interest were predictive of mind wandering. In addition, there was a significant interaction between grit and interest and such interaction was also found to be moderated by the third variable, seating position. Ultimately, this study highlights the important roles that grit and level of interest play in determining the likelihood of mind wandering, particularly in the classroom.

Field of Study: Psychological Science Student's Signature

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Chapter 1

Introduction

With the rapid evolvement of our world and competitive education system, educational psychology in Thailand is clearly at a point where it is set to become indispensable. With an increased in government's budget for education, Thailand is aiming to improve educational processes and systems and become an International center for quality education. One of the most intriguing questions in education is how to enhance the learning and academic performance of the students. In the present study, we examined several potential correlates of mind wandering, mainly the academic, contextual and affective variables such as grade point average, course interest, seating position, academic performances (GPA) and most importantly, a personality trait, grit.

Mind Wandering

Mind wandering or daydreaming is probably one of the most common things we, human, do and also one of the most private. Estimates suggested that many of us spend close to 50 percent of our mental activity on daydreams (Mooneyham & Schooler, 2013). Regardless of its long usage in everyday life, there is yet a consensus on its definition (Giambra, 1999). In psychology however, mind wandering was believed to involve the withdrawal of attention from current sensory input (Smallwood, Fitzgerald, Miles, & Phillips, 2009) or "the decoupling of attention from an immediate task context toward irrelevant concerns" according to Mooneyham and Schooler (2013). In the current study, we simply defined mind wandering as any unintentional mental states or attention lapse that are irrelevant to what we are doing (Lindquist & McLean, 2011).

Recent researches have revealed a simple fact that human are not always the

masters of their own minds (Mrazek et al., 2011). Although there are circumstances in which mind wandering are advantageous; for instance, in autobiographical planning, and creative incubation (Mooneyham & Schooler, 2013), the costs of mind wandering in educational setting are far more damaging. The fact that we often find ourselves at the end of a page with no recollection of having processed the material just read is one evidence. In fact, the robust relationship between the mind wandering frequency and reading performance has been well established. According to Mooneyham and Schooler (2013), negative correlation was found between the frequency of mind wandering and performance on subsequent comprehension tests. This indicated that individual whose mind wander more often tend to perform poorer on the tests. Smallwood, Fishman, and Schooler (2007) attributed such finding to the failure in building propositional model of the text, such that individuals' ability to form a general reading models while reading was reduced with the occurrence of mind wandering. Alternatively, superficial perceptual encoding might be responsible for poorer reading performance during the episodes of mind wandering (Smilek, Carriere, & Cheyne, 2010). It was found that participants exhibited more eye closures (blinks) and fewer fixations on the text when their minds wandered. This in turn associated with errors in vigilance to external stimuli (Smilek, Carriere, & Cheyne, 2010) and thus, further support the fact that mind wandering comes at a cost when reading.

Furthermore, researches showed that mind wandering was associated with the working memory (Smallwood, McSpadden, & Schooler, 2007). Using probe-caught self-reported method, mind wandering frequency was negatively correlated with scores on

tests of working memory capacity- the operation span task and, the reading span task (Risko, Anderson, Sarwal, Engelhardt, & Kingstone, 2012; Mooneyham & Schooler, 2013). Smallwood, Fishman, and Schooler (2007) proposed that mind wandering interfered in encoding process. During the episode of mind wandering, the information processes of the input stimulus was believed to be inhibited; therefore putting individual at disadvantage in information processes and understanding the text (Giambra, 1989).

In addition, psychological well being was found to make a significant contribution to the maintenance of attention, which is an indirect markers of mind wandering episode (Szpunar, Moulton, & Schacter, 2013). Studies have shown that mind wandering tend to occur more often among individual who were feeling tired, stressed, or uninterested (Szpunar, Moulton, & Schacter, 2013). However, to our knowledge, many schoolteachers and lecturers tend to clump the content into one class without realizing the consequence of long-hour teaching. It was found that the frequency of mind wandering is positively correlated with time spent during class, such that the longer time spent in class, the higher the likelihood of mind wandering (Lindquist & Mclean, 2011). Although some scholars believed that negative mood induced greater unrelated thoughts (Smallwood, Fitzgerald, Miles, & Phillips, 2009), evidence suggested the otherwise that mind wandering was an antecedent of negative mood and not the other way around. Individuals were more likely to report being less happy when their minds wandered (Mooneyham & Schooler, 2013). Thus, these studies provides important evidence in favor of the costs of the mind wandering in educational context.

Interest

In recent years, the importance of interest and its positive influence on learning was getting recognized by many researchers. Regardless, past researches suggested that interest and attitudes among students toward college tend to decline with time (Hidi, 2006). As a result, many researchers looked for a variety of motivational variables hoping to reverse the trend (Hidi, 2006). Mitchell (1993) suggested that classroom boredom might serve as a precursor of lack of motivation to learn. In fact, many school teacher, professor and researchers have indeed used the terms “interest” and “intrinsic motivation” interchangeably; however, some researchers had demonstrated a clear distinction between the two constructs (Boekaerts & Boscolo, 2002). Despite the pivotal role interest plays in education, there is yet universally accepted definition (Linnenbrink-Garcia et al., 2010). According to Hidi (2006), interest could be understood as a “psychological state that occurs during interactions between persons and their objects of interest”.

In most educational research, the construct of interest can be divided into two parallel forms, situational and individual interest (Hidi, 2006). The former put more emphasis on favorable environmental conditions such as instructor or class environment; therefore, it is more transient in nature (Linnenbrink-Garcia et al., 2010). On the other hand, individual interest is deeper and more intrinsic, because it based on previous knowledge and values towards ideas and objects (Linnenbrink-Garcia et al., 2010). In addition, Ainley, Hidi and Berndoff (2002) introduced what he called “topic interest”, which can be defined as “interest elicited by a word or paragraph that present the reader

with a topic” (Ainley, Hidi & Berndoff, 2002). This type of interest is not necessarily equivalent to either situational and individual interest; however, both could potentially affect topic interest (Ainley, Hidi & Berndoff, 2002). The study attempt to unravels the processes that explain how interest influence learning by looking at the association between topic interest, affective response, persistence, and test score on comprehension and recall. Result indicated that not only the characteristic of the person or situational interest were responsible for the variability in the affective response, topic interest too was found to be related (Ainley, Hidi & Berndoff, 2002). On top of that, this affective response was associated with persistence with the text, which in turn associated with learning (Ainley, Hidi & Berndoff, 2002). Regardless of the types of interest, the study revealed a dynamic set of processes that explain the the effect of interest on the learning outcomes (Ainley, Hidi & Berndoff, 2002).

Furthermore Hidi (2001) proposed that interest in general plays a major role in students’ learning abilities because of its association with automatic attention, which served as a mediator between interest and learning. According to Hidi (1990), selection and processing of information was determined by interests. Interest seem to underlie how attention is allocated and contributed to the course and the outcome of our cognition (Hidi, 1990). Subsequently, Hidi (1990) found that the comprehension and recall among fifth and sixth graders was better when the passages were rated as interesting. In fact, it was suggested that efficiency in processing of interesting information may be even better than that of important information (Hidi, 2001). It could be that interesting topic encouraged higher degree of cognitive organization (Hidi, 1990), which in turn enhance

comprehension performance. Subsequently, Boekaerts and Boscolo (2002) proposed that both types of interest influence learning abilities for its influence in retrieving the memory and acquiring new knowledge.

As a result, many researchers acknowledged interest as a critical motivational variable and attempt to search for the answer to why some students become more interested in certain areas than others. Interestingly, it was possible for students to develop their interest towards areas they have never feel interested before (Ainley, Hidi & Berndoff, 2002) . Hidi and Renninger (2006) revealed that educators could positively influence students' academic interests through several ways. For instance, teachers could demonstrate their own interest for subject matter or opt to select resources that would trigger students' interest (Hidi & Renninger, 2006).

However, the promotion of interest in learning situation should be carried out with careful consideration. Study investigating the influence of situational variables on interest yielded mixed results. One study conducted by Reeve (1989) found that college students reported being more interested at the presence of collative motivation, in this case using color, location of the text, and font size, compared to those worked with plain text. As a result, provide support for the effect of collative features on task interest. On the other hand, Harp and Mayer (1997) found different result when visual enhancements was added to the material. The level of interest among participants when attractive photograph was presented in the material was not differ from the condition when the attractive photograph was absent. (Harp & Mayer, 1997). Therefore, such results indicated that collative features did not guarantee the effect on task interest. In fact, Durik

and Harackiewicz (2007) own study found that collative-rich environment (i.e., visually stimulating notebook) was only effectively in fostering interest among participants with low individual interest.

Furthermore, Kintsch (1980; as cited in Harp & Mayer, 1997) has proposed two additional type of interest- emotional and cognitive interest. The former was similar to situational interest which aim to increase readers' attention and learning overall by adding captivating material to the textbook lessons (Harp & Mayer, 1997). However, this particular material is unrelated to the explanation; nevertheless, it was used to foster the curiosity and interest (Harp & Mayer, 1997). In contrast, cognitive interest refer to circumstance when the interestingness of scientific passages increase as a result of readers' being able to understand them. Harp and Mayer (1997) argued that cognitive interest promoted the construction of a coherent macrostructure and causal chain by assisting readers in the allocation of their attention on important information and connected the pieces of information together in a meaningful way. Interestingly, result from Harp and Mayer's (1997) study revealed that emotional interest adjuncts was detrimental to learning in a way that it leads to distraction and the failure in constructing connections among important steps in the causal chain (Harp & Mayer, 1997). Hence, the results supported the advantages of cognitive interest over emotional interest.

Grit

Grit can be understood as “perseverance and passion for long-term goals” according to Duckworth, Peterson, Matthews, and Kelly (2007). Gritty individual most likely to persist when others give up. Many of us would have experienced, at some point

in our lives some highly talented individual being surpasses by less talented, but more persevering individual. In fact, grit was found to be an effective predictor of achievement and positive outcomes across domains (Joseph, 2009); for example, in the process of acquiring expertise (Ericsson, Krampe, & Tesch-Römer, 1993), and physical performance at the United States Military Academy (Buller, 2012). Indeed, Duckworth, Peterson, Matthew, and Kelly (2007) found that grit scores were associated with higher grade-point average, such that gritty individual have greater GPA than less gritty individual. Moreover, it was found that grit is an important factor for which decisively affects the nature of metacognition, which refer to knowing own thoughts (Arslan, Akin, & Citemel, 2013). According to Duckworth et al. (2007), grittier individuals tend to be assiduous in pursuing their goals and not to give in easily upon facing with obstacles. Consistent with prior statement, result from Arslan, Akin, and Citemel (2013) study also revealed that gritty students regardless of how challenging the class was, they continue to do their best in order to attain good grade. When stumbled upon failures, they looked for alternative to solve the problem.

In fact, the positive relationship between achievements and grit level was also evidenced during the research on spelling bee national competition. Results suggested that gritty individual tended to outperform less gritty individuals (Duckworth, Kirby, Tsukayama, & Ericsson, 2011) and this could be because (better) spellers devoted more hours for deliberate practice to study the characteristic, uniqueness and roots of each word and even complete number of mock quizzes to win the National Spelling Bee competition. In order to be skillful, they need to continuously studying every single

words listed in the dictionaries by heart, and undoubtedly, it was effortful and not so much enjoyable. Thus, gritty individuals, who have higher determination and perseverance would be able to attain to this task better than less gritty individuals. Similarly, such concept also apply to people who are taking a doctorate degree (Cross, 2013). They too need to sustain their passion and perseverance towards the goal.

Furthermore, research by Eskreis-Winkler et al. (2014) suggested that grit also associated with a retention in a field of lifetime educational achievement such as Cadet Examination in the United States and other aspects of life including drop out of school or marriage. In fact, among many predictors such as a score of aptitude test (i.e., SAT), high school ranking, or level of self-control, grit score was found to be a better predictor in measuring cadet's retention in terms of physical and mental stamina (Eskreis-Winkler et al., 2014). Cadet with high grit score did not only aim to complete a task at hand but also striving towards the higher order goals regardless of a long working duration (Eskreis-Winkler et al., 2014). Study also revealed that individuals with sufficient grit score were less likely to drop out during a 24- day course and they tend to remain in a long-term job employment three months later than low grit individuals (Eskreis-Winkler et al., 2014). Moreover, grit also contribute in determining the academic success of high school students. When it comes to personal relationship, separated or divorced men were more likely to be those with low grit, whereas gritty men tend to successfully find their companion and get married. However, such trend was not applicable to women population (Eskreis-Winkler et al., 2014).

Seating Position

The influence of classroom environments on students' learning abilities has long been known to capture attention from many educational researchers (Montello, 1988). This includes for instance, lighting, size of classrooms or background noises (Montello, 1988). In addition to those physical variables, seating position was considered one of the main factors that affect students' learning (Montello, 1988). Researches suggested that seating location plays substantial roles in students' participation, attitudes towards subjects, lecturers and academic achievement (Montello, 1988). In particular, negative relationship between seating location and GPA was found among university students in the United States (Stires, 1980). In this case, it is possible that participants' interest serve as a mediator to academic performance, because participants sitting nearer to the front tend to report more positive interests toward lecturers as well as class participations. In contrast, students sitting at rear tend to talk among themselves and have their heads out in the clouds. Weinstein (1979) attributed such finding to the self-selection hypothesis, which stated that, in line with the stereotype, students who select the front and centre seats are brighter and more interested in the course in the first place.

Furthermore, other research has supported that seating location does play a role in academic achievement. For instance, a research of Levine, O'Neal, Garwood, and McDonald (1980) has proposed that seating location has an effect on grades. They have showed that students who chose to sit in front tend to perform better on the academic achievement, particularly on the examination (Levine et al., 1980). This could be explained by the relationship between instructor and the front-seat students - eye contact

with the lecturer could enhance students' participation.

However, studies on seating location have revealed two different trends. Some researchers found inconsistent result regarding the influence of seating location on academic achievements. . According to Millard and Stimpson (1980), assigned seating location had no effect on students' GPA. During the experiment, participants were randomly assigned to the provided seats, which was divided into three different zones: front, middle and back, and required to complete a multiple-choice questions exam. Every two weeks, students would be reassigned to new distance zone, as well as the exam completion. Students' achievement would be measured based on the exam score. The result collection lasted for 4 weeks and revealed that the mean exam scores of students across three zone was not significantly different. Based on the self-reported data, the change in the distance zone did not have profound effect on learners' enjoyment, interest, inclusion and motivation (Montello, 1988).

What could underlie such inconsistent results Wulf (1970) thought was the way each participant assigned to the seat. In his study, he wanted to find out if the relationship between seating and students' exam scores would be influenced by the student's choice of seating location during two semesters. During the first semester, participants were allowed to choose their own seats (self-preference), while in the second semester, participants' seating position were assigned by the experimenter. Participants' achievement were measured based on the exam score administered after each semester. The result revealed not only an insignificant effect of seating on GPA, but also, an increase in a level of participation among students, which was found in the first semester

(Wulf, 1970).

In conclusion, the question regarding the effect of seating location on academic achievement remains inconsistent. Nevertheless, classroom variables such as unsystematic, or different grading system, room size or shape and its overall seating configuration are several possible underlying factors as suggested by Montello (1988). In fact, Montello (1988) found that despite the fact that a significant grade effect was not found in some experiments, seating location seemed to play a role in classroom behaviour or attitudes of students (Montello, 1988). A research study of Kinarthy (1975; as cited in Montello, 1988) suggested that front-row students tend to be rated from classmates and instructors as more attentive and likeable (Montello, 1988). This is also consistent with the study of Stires (1980) where middle-seat students rated the course and lecturer more positively than students sitting to the side. This could be explained by the self-perception theory, which stated that people tend to rely on the external cues before they come to understand their inner states. Following the theory, students' attitudes toward the course and lecturer were formed by observing on classroom's environment (Montello, 1988). For instance, the characteristic of talkative students, as being intelligent and attentive, was more likely to motivate other classmates to increase their participation level.

Literature Review

Although there had been some efforts to study the costs of mind wandering; for instance, in reading (Mooneyham & Schooler, 2013), in comprehension test (Smallwood, Fisher, & Schooler, 2007), and academic performance (Wagman, 1968), only a few studies examined the possible factors associating with the frequency of mind wandering.

Due to scarcity, Lindquist and Mclean (2011) conducted a research to investigate the relationship between mind wandering and its correlates in an educational context. The results from their study suggested the likelihood of mind wandering decreased when the course was perceived as interesting. Furthermore, sitting nearer to the front was found to be associated with lesser mind wandering. In addition, a negative correlation between GPA and the frequency of mind wandering was found indicating that students with higher GPA tend to report less mind wandering.

Despite the fact that Lindquist and Mclean (2011) provided an important insight into the correlates of the frequency of mind wandering, one possible limitation within their study was the sensitivity of the course interest measure. In their study, only one 5-point Likert scale item attempt to address interest in the lecture (i.e., how interesting have you found John McLean's lecturers and cognitive psychology so far?). Thus, it is possible that the construct of course interest was not well captured using only this one item.

Furthermore, while most studies placed their concerns on other cognitive and affective variable (Lindquist & McLean, 2011), very few if not any study has ever attempted to examine the relationship between daydreaming and personality, particularly grit. Although some researcher had reviewed the possible overlap between vocational interests and personality traits, results revealed a relatively low correlation between personality traits and interest (Ackerman & Heggstad, 1997). Nevertheless, such finding cannot be generalised to other type of interest or context. Since both mind wandering and grit were found to be related to academic performance, it is interesting to include grit

measurement as one of the variables. Failing to include such variable may leave psychologists unable to generate theories that could be substantiated in the future.

In review of the drawbacks from the previous study, the present study attempt to extends this line of research on the correlates of mind wandering in two ways. First, we improved the measure of course interest by employing a scale developed by Linnenbrink-Garcia et al. (2010). We decided to use this version of questionnaire not only because it is appropriate for assessing adolescents' interests in educational context, but also suitable for measuring the effectiveness of various interventions for classroom's environment. The measure focuses on the overall experiences of individuals and thus allowing us to further investigate the effectiveness of various interest-enhancing strategies. Second, we reviewed the potential influence of personality (i.e., grit) on the frequency of mind wandering in educational setting.

Theoretical Framework

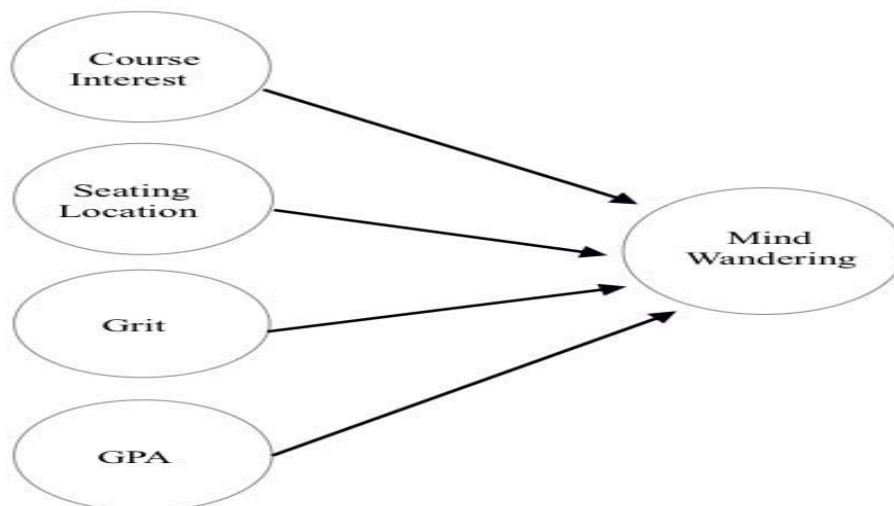


Figure 1: Theoretical framework

Hypotheses

In the present study, there are total of four hypotheses. Firstly, we predicted that people who have higher GPA are less likely to mind wander. Secondly, mind wandering frequency would be lower for participants with high interest than those with low interest. Thirdly, we hypothesised that gritty individuals are less likely to mind wander compared to the less gritty individuals. Lastly, we predicted that participants sitting in front would mind wander less than those sitting at the back of the class.

Objective

Due to the fact that lectures served as a primary means of knowledge transfer, this research aims to identify some possible factors that associated with the frequency of mind wandering and stimulate investigation and theoretical development so that we can obtain a better understanding of daydreaming and its role in educational settings.

Chapter 2

Method

Participants

Participants were fifty-two undergraduate students studying in a Joint International Psychology Program, Chulalongkorn university. Twenty two of them were recruited from Introduction to Cognition class while the other thirty were recruited from Dr. John McLean special lecture. Of all participants, five participants did not complete the questionnaire; thus these individuals were excluded from the analysis. The resultant sample included forty-six participants, 15 were male while the other 32 were female whose age ranges were between 15 to 22 years old ($M = 18.6$, $SD = 1.15$ years).

Research Design

The study involve a 2 (interest) x 2 (grit) x 2 (seating) between-group factorial design with three independent variable, the first one being the level of interest (high vs. low), the second one being grit (high vs. low) and the third being the seating position (front vs. back). In the study, the focal dependent variable was mind wandering frequency.

Materials

Mind wandering. A measure of mind wandering was obtained using a probe-caught mind wandering method employed by Linnquist and McLean (2011). This method only involves presenting a loud auditory probe signal to individuals intermittently as they listen to the lecture and asked them to describe whether, at the moment that the probe occurred, the participants mind wander.

Interest. A measure of interest was obtained using a scale developed by Linnenbrink-Garcia et al. (2010). This 14-item self-report questionnaire containing a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) instead of the original 7-point Likert scale. Among all items, five items measured students' affective reactions to the lecture presentation as enjoyable (e.g., I enjoy coming to the lecture), while the other nine items focused on how much the course material itself (e.g., Psychology fascinates me). Item number 7, 10, 11, and 13 were negatively worded (e.g., "The lectures in this class aren't very interesting") and will need to be reversed score. In the current study, the items used were revised to more closely match our theoretical conceptions. The measure of students' interest appeared to have good internal consistency ($\alpha = .91$).

Grit. A measure of grit was obtained using Samartlerdee's (2013) measure. This 17-item measure contains a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) asking participants' the degree to which they agree with the statements. Higher scores indicate a higher level of grit. Of all the items, item number 13 and 17 were removed from the survey due to redundancy and low discrimination index. Item number 2, 3, 4, 5, 7, 14, and 15 were negatively worded (e.g., "I keep being distracted from my goals") and these items needed to be reverse-scored. Cronbach's alpha for seventeen items was .86.

Demographic variables. A single questionnaire will be used effectively to assess demographic information which including age, gender, GPA, seating position, and the major of study.

Procedures

The study was conducted in two lecture classes within an International Program at Chula, and that one of those was a visiting lecture from a UQ psychologist where attendance was mandatory but the content not examined for grades in the program. The second lecture was a regular (and assessed) lecture within the International Program, given by a resident International academic staff member. Moreover, the second lecture included some activities, which made for non-ideal comparison.

Participants were told that their participations were voluntary and they may withdraw from this research any time they wish or skip any question they do not feel like answering. Leaving the questionnaire blank would indicate researchers their refusal to participate. They were also be told that their responses would remain confidential and their refusal to participate would not result in any penalty or loss of benefits to which they were otherwise entitled to. Participants were given the first part of the experiment; a copy of mind wandering frequency recording. The instruction on how to fill it in were also be given out by the lecturer, along with the sample of the alarm. Throughout the lecture, six signals would be prompted randomly and participants would be asked to record dichotomously (yes/no), whether they were experiencing daydreaming at the moment or attending to the lecture-related content when the sound occurred. Participants were given approximately fifteen seconds to record their response before the lecturer continued. At the end of the class, second part of the questionnaire was distributed, which includes demographic information, interest questionnaire, and grit scale.

Contributions

The design of the grit scale used in this study was the co-creation with our tutor and classmates from PSYC3020 Measurement in Psychology class in semester 2 of 2013, The University of Queensland. Using a deductive technique, each of the contributors were requested to present a list of the grit-related statements and shared them with the whole class for selection, hoping to generate items that would be face valid and tap the construct under examination. The items were revised and advised by the contributors, as well as our tutor, Dr. Philippe Lacherez. With the new grit scale, several limitations from the previous literature had been improved; for instance, redundancy and double-barreled statements that might have confused the readers were eliminated. The scale was reduced to its final form comprising 19 items and they were subjected to psychometrics analysis examining the reliability, by measuring the internal consistency and computing item-discriminability index. Results showed that the scale appears to have adequate internal consistency (19 items; $\alpha = .86$). Intercorrelations between the new grit scale and other scales were examined to establish construct validity ($r = .69, p < .001$).

Chapter 3

Results

Reliability Analysis

Reliability analyses was conducted to examine the reliability of the grit and interest scales after being revised to ensure that they are psychometrically sound. Results showed that both scales exhibit good internal consistency with cronbach alpha of .74 and .82 for grit and interest scale respectively.

Preliminary Analysis

Means, standard deviations, and Pearson's correlations are shown in Table 1. GPA was found to be a significant negative correlated to mind wandering behaviour, such that participants with higher GPA are less likely to mind wander during class. Likewise, interest was also found to be negatively correlated with mind wandering. This indicated that participants who have high interest are less likely to mind wander. In contrast, grit, interest, seating position, age, and gender were not significant predictors of mind wandering. Further, there was a significant positive collinearity between gender and GPA suggesting that females tend to have higher GPA, compare to male. However, the relationship is not strong enough to pose a collinearity problem. Therefore, these results show that only interest and grit were valid predictors of mind wandering frequency. Seating position, age and gender were invalid, but non-collinear predictors of mind wandering.

Table 1.

Descriptive Statistics and Zero Order Correlations between Mind Wandering, Grit, Interest, GPA, Seating Position, Age, and Gender.

Variable	<i>M(SD)</i>	Grit	Interest	GPA	Seating position	Age	Gender
Mind Wandering	2.43(1.05)	-0.118	-.32*	-.38*	0.14	0.13	0
Grit	54.46(6.48)	-	0.2	-0.08	0	-0.06	-0.08
Interest	53.04(5.46)		-	-0.12	-0.074	0.2	0.15
GPA	3.38(.40)			-	0.098	-0.31	.34*
Seating	2.72(1.19)				-	0.11	0.04
Age	18.17(2.98)					-	0.2
Gender	.70(.47)						-

Note. $N = 46$. Maximum possible score on mind wandering = 6.

* $p < .05$

Principal Analyses (Predicting mind wandering frequency)

A three-way 2 (grit: high, low) x 2 (interest: high, low) x 2 (seating position: front, back) between groups ANOVA were conducted to examine the effect of independent variables on the frequency of mind wandering. The overall grit scores and interest scores were divided into high and low levels by median split methods. The results showed no main effect of interest, $F(1, 38) = 1.87, p = .179, \eta^2 = .04$. Likewise, main effect of grit and seating position were not found, $F(1, 38) = .68, p = .413, \eta^2 = .01$ and $F(1, 38) = .28, p = .602, \eta^2 = .01$, respectively.

Nevertheless, a two-way interaction between grit and interest was significant, $F(1, 38) = 4.62, p < .05, \eta^2 = .09$, indicating that the effect of interest on mind wandering frequency for low grit individuals was significantly different from the effect of interest on mind wandering frequency for gritty individuals as shown in Figure 2. In particular, when

students are high in grit, the difference in mind wandering frequency between participants who exhibited high ($M = 2.40$, $SD = 0.91$) or low interest ($M = 2.20$, $SD = 1.14$) was not significant, $t(23) = -0.49$, $p = .562$. Whereas for low grit group, the difference between high or low interest group was significant, $t(19) = 2.50$, $p < .05$ (refer to Figure 3). Participants who scored high in interest mind wandered significantly less ($M = 2.00$, $SD = 0.67$) than did those who scored low in interest ($M = 3.09$, $SD = 1.22$). However, grit x seating interaction was not significant, $F(1, 38) = .003$, $p = .953$, $\eta^2 = .00$, as well as the predicted interest x seating position interaction, $F(1, 38) = 1.63$, $p = .209$, $\eta^2 = .03$.

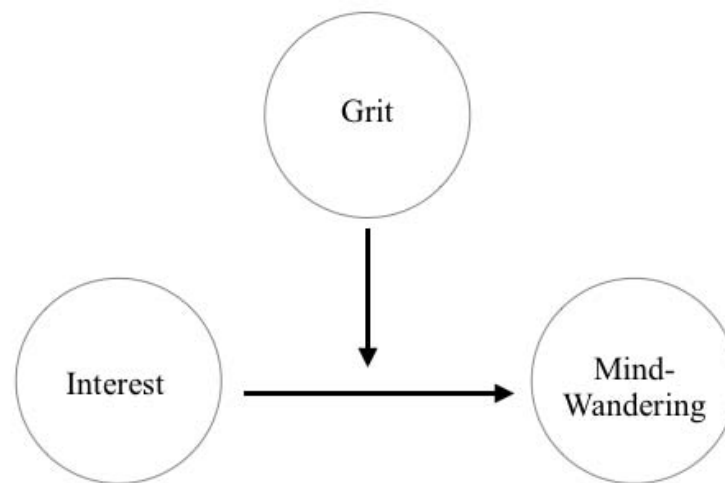


Figure 2. Statistical path diagram for moderation effect of grit on the relationship of interest and mind wandering

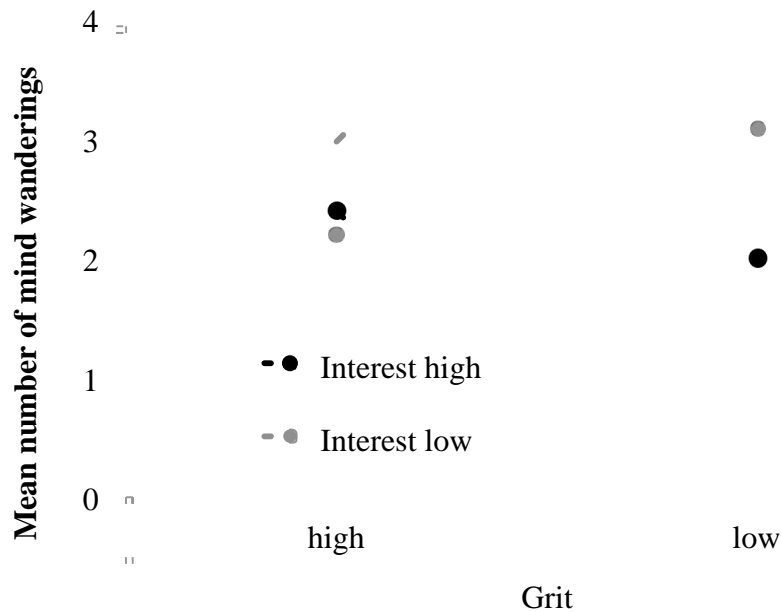


Figure 3. Shows the mean and the standard deviation of mind wandering frequency given by participants who were high and low in grit and when the lecture was rated as highly interesting and low interesting.

Furthermore, a three-ways interaction among interest, grit, and seating position was significant, $F(1, 38) = 4.99, p < .05, \eta^2 = .09$. This indicated that the effect of interest on mind wandering frequency on different level of grit was also different at the level of seating position as shown in Figure 2 and Figure 3. The simple effects of grit x interest was then analysed for each level of seating, as shown. For those sitting in front, under high grit group, participants exhibiting higher interest mind wandered more than did those with low interest ($M = 2.86, SD = .90$ and $M = 1.60, SD = .55$, respectively), and the difference was significant, $t(10) = -2.76, p < .05$.

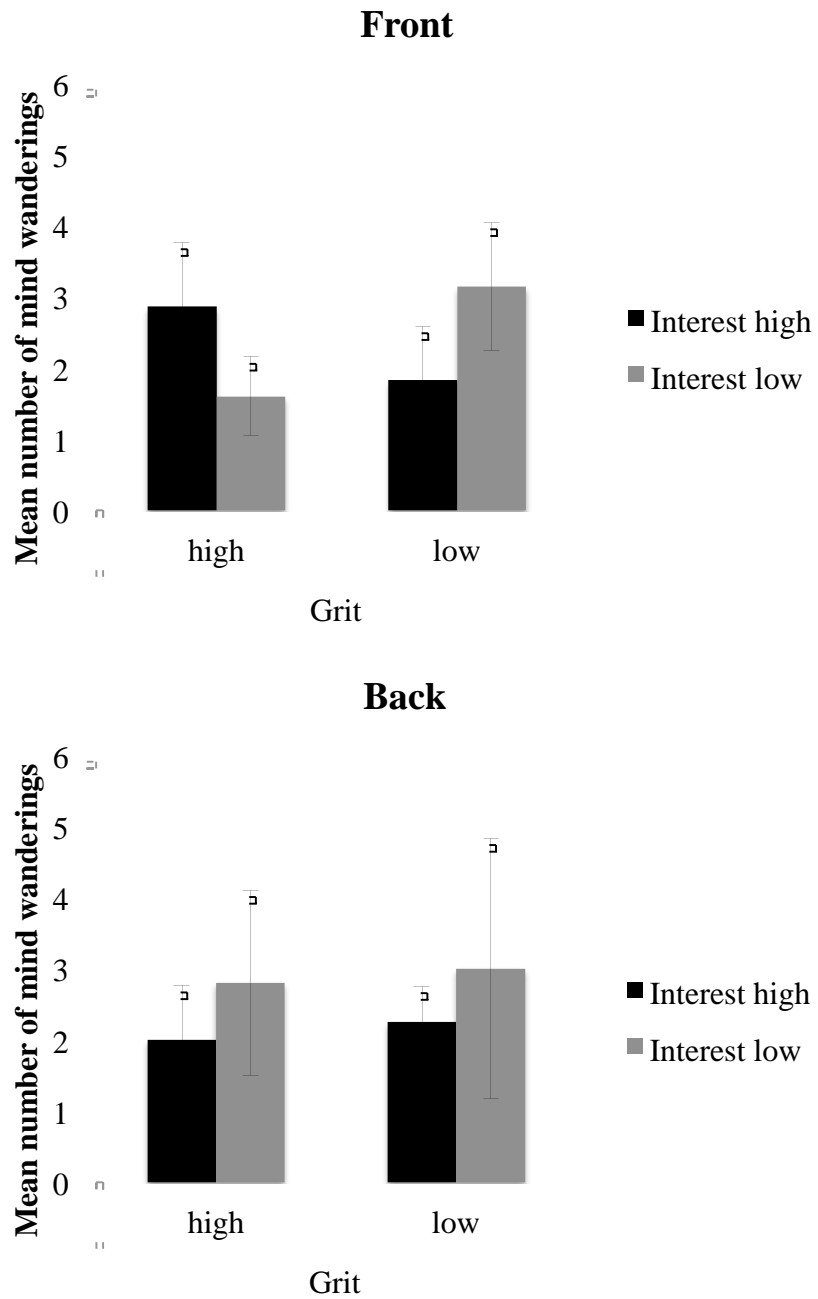


Figure 4. Show cell means of mind wandering frequency as a function of grit and interest at the level of seating position. The error bars represent standard deviation.

Additional Findings

A standard multiple regression was conducted to examine the association of frequency of mind wandering as the criterion and grit, interest, GPA, and seating position as predictors. The result revealed that these predictors explained 25% of the variance in mind wandering frequency, $F(3, 30) = 4.58, p < .05$. Individually, GPA negatively correlated with mind wandering, such that higher GPA significantly predicted less mind wander, $\beta = -.43, p < .05$, and accounted for 18% of the variance in mind wandering. Subsequently, interest was negatively correlated with the criterion, such that high interest predicted less mind wandering, $\beta = -.37, p < .05$ and was accounted for 13% of the in mind wandering frequency. It was found, however, that grit was a nonsignificant predictor of mind wandering ($\beta = -.11, p = .485$). In addition, GPA was a more important predictor compared to interest and grit. Also, the predictors did not suffer problems of collinearity.

Chapter 4

Discussion

In this study, we have examined how interest, grit and seating position influence mind wandering frequency. As outlined previously, there were four hypotheses were partially supported in the present study. First, we expected that people who have higher GPA would be less likely to mind wander. As expected, a significant negative correlation between mind wandering frequency and GPA was found, indicating that higher GPA participants were less likely to mind wander. However, it should be noted that such relationship did not show experimentally whether mind wandering lower academic performance (GPA) or whether being less smart (low GPA) makes one's mind wander more due to the absence of main effect. Still, this is consistent with previous work (Lindquist & McLean, 2011) and provides evidence that mind wandering is detrimental to learning and academic performance. Since attention is crucial for academic attainment, when attention was decoupled during the episode of mind wandering, learning is diminished (Szpunar, Moulton, & Schacter, 2013). Smallwood, Fishman, and Schooler (2007) suggested that unsuccessful encoding of information as a result of mind wandering, limit the individuals' ability to form general models required for reading. This explanation could be used to explain the observed negative correlation between mind wandering and GPA in the current study.

Next, we hypothesised that people who scored high on interest scale would mind wander less than those with low interest. Inconsistent with this prediction, categorical measure of interest did not reveal an effect, but the continuous measure did. The failure to find differences in students' ratings of interestingness raises the possibility that the

number of participants in the present study was limited; thus reducing statistical power. Another explanation is Hidi (2006) suggested that humans have restricted access to their own motivation and thus, not always conscious of them. As a result, using subjective data might be inadequate and thus, limit the results.

Nevertheless, results showed that interest was negatively correlated with mind wandering frequency, indicating that uninterestingness was associated with higher rate of mind wandering, supporting the notion that mind wandering plays an important role in determining students' level of learning because of its association with attention, which served as a mediator between interest and learning (Hidi, 2001). Although we did not directly examine attention, our results served as an important extension of previous studies of interest and mind wandering.

Additionally, we predicted that participants sitting at the back would mind wander more than those sitting in front. However, the difference between front and back seaters was not significant. Similar to the problem mentioned above, it could be explained by the small classroom size or potential confounds within the classroom context; for instance, distraction or teaching methods. In our study, participants were on average sitting between rows 2 and 3 of a small classroom, whereas Lindquist and McLean found a relationship between mind wandering and seating in large lectures with more than 20 rows of seating. In fact, Becker, Sommer, Bee and Oxley (1973) demonstrated that the level of attentiveness were higher in small class compared to medium or large class. In addition, the attentiveness among students sitting at the back could be enhanced through classroom activity; for instance, verbal discussion (Montello, 1988). Such activities could

potentially reduce the rate of mind wandering as students were engaging in the task provided.

Despite the non-significant effect of seating location and mind wandering rate, three-way interaction between grit, interest and seating was found. This indicated that the effect of interest on mind wandering frequency on different level of grit was also different at the level of seating position. However, a follow up analysis revealed an unexpected result that for those sitting in front, under high grit group, participants exhibiting higher interest mind wander more than those low interest. One possible explanation could be explained by the self-selection hypothesis proposed by Stires (1980) who stated that individual who selected to sit in front tend to stereotyped themselves as being smarter and more interested in the class. By believing in that these students could have lowered their guard and allowed their mind to wander unintentionally. Gritty people only lowered their guard for mind wandering when they were interested and sitting in front. If either of these were lacking, they did not lower their guard. Nevertheless, future research is needed for validation of this assumption.

Lastly, we hypothesised that gritty individuals are less likely to mind wander compared to the less gritty individuals. Inconsistent with expectations, the difference between grit and low grit groups was not significant. Nevertheless, the influence of individuals' disposition on mind wandering should not be disregarded. Because Duckworth et al. (2007) found that grit was positively correlated with academic performance and many achievements, it is possible that there is an overlap between grit and mind wandering.

However, the significant two-way interaction between grit and interest on mind wandering frequency was found indicating that participants who scored high in interest mind wander significantly less than those who scored low in interest, providing that both group are low in grit. Since very few if any study has ever attempted to look at grit as a predictor of mind wandering and a moderator between interest and mind wandering, result from the present study demonstrate an important and novel contribution grit make as a moderator on the relationship between interest and mind wandering frequency. Hence, the present study serve as a justification for further research into several dispositional factors that influence mind-wandering frequency.

Methodological Considerations

Weaknesses. Still, the current study held some limitations. It cannot be denied that a small number of participants could threaten the generalisability, whereby the sample might under-represent the whole population. Inevitably, reliance on self-reported data contains various potential sources of bias. Furthermore, the study was conducted in two lecture classes and that one of those was a visiting lecture from a UQ psychologist where attendance was mandatory but the content not examined for grades in the program. The second lecture was a regular and the content would be assessed in the examination, given by a resident International academic staff member. Consequently, this could have affected the mind wandering frequency in which participants could have taken the class less seriously and paid less attention under the condition where the contents would not be examined. Similarly, being required to attend the class could affect the level of interest, which in turn affect the result overall. Seating arrangement too, was not standardised

between the two class due to the difference in classroom size. As a result, one of the main limitation in the current study could be attributed to the differences between the two classes. During the class, participants were allowed to leave or enter the class freely, mind wandering might be attributed to distraction by other students rather than due to lecture content or personality factors.

Strengths. The strength of the present study lie in the methodology. First, a revised scale developed by Linnenbrink-Garcia et al. (2010) was used to measure participants' overall interest. This was to overcome the limitation found in Lindquist and McLean (2011) study and to ensure that the influence of interest was well captured. Furthermore, probe-caught method was used to reduce the problems of forgetting and reconstruction error and access to the experiences that might otherwise not be reported (Ericsson & Simon, 1980; as cited in Lindquist & McLean, 2011). Most importantly, the current study demonstrated an important and novel contribution grit make as a moderator on the relationship between interest and mind wandering frequency.

Future Directions

Future research should attempt to examine the influence of seating position more carefully, hoping to find alternative explanation to pertinent findings. Furthermore, it would be interesting to investigate how different aspects of interest associate with mind wandering; for instance, topic interest or situational interest. Most importantly, if the present study is to be replicated, the experimenter should ensure that they have enough sample size to detect the differences accurately and attempt to have a more controlled experiment; for instance, classroom environment so as to reduce the potential

confounding variables

Practical Implications

Nevertheless, a practical implication worthy of the present study is that this study reflects a growing research that is related to educational settings. Research on mind wandering represents an important venue for examining the potential overlap between academic performances, affective (e.g. interest), and contextual variables (e.g. seating position). More, importantly, the interaction effect found between grit and interest on mind wandering frequency has strengthened our knowledge that personality trait could somewhat influence mind wandering in educational context. The utility of the current study could be to provide educators with information as to what could influence the frequency of mind wandering and increase the awareness among teachers in order to enhance students' learning either through classroom environment or teaching methods. Teachers who recognise the potential benefits of increased academically relevant mind wandering may be best positioned to enhance their students' learning. Since Thai and global desire to improve teaching and learning, the present study demonstrates that we can scientifically study the teaching & learning process along with the obstacles such as mind wandering, and use this psychological information so that Thailand can take a leading role in improving educational practices

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Appendix A: Memo to the Dean

**Memorandum**

Department Joint International Psychology Program, The Faculty of Psychology Tel. 89922

ที่ จ. /2555

Date : January, 2014

Subject : Requesting permission to test human subjects

To : Dean, Faculty of Psychology, Chulalongkorn University

I would like to request permission to collect experimental data from human subjects, undergraduate students at Chulalongkorn University. I would like to recruit participants from Joint International Psychology Program (JIPP), during a special lecture of Dr. John McLean (approximately 70 students). Below is detailed information about this study.

Experiment name: Daydreaming

Contact person: Miss Sasiporn Samartlertdee

Email: ssp_smltd@hotmail.com

Tel: 02-415-8936 us to gain insight into certain intervention programme hoping to improve classroom environment. Not only this would benefit lecturers, with interesting and engaging classroom, it would also assist students' learning as interaction between lecturers and students is crucial for better learning.

Participants: Joint International Psychology Program students (third and fourth cohort)

Design: Participants will ask to response to a set of questionnaire accordingly.

Materials: Daydreaming frequency recording, grit, interest, and demographic information sheet. Each participants were have to complete these sheets accordingly.

Procedure: Participants entered the lecture room and were given a set of questionnaire. Once seated, they will be asked to fill up the first part of the questionnaire on their on at the beginning of the class. These sets of questionnaire includes demographic, interest, and grit scale. In the beginning of the class, participants were informed that there will be five alarms during the lecture and they were asked to report whether they were experiencing daydreaming at the time when alarm occurred into the daydreaming recording frequency sheet. After the first alarm, participants were not informed when will be alarm occur. Participants were also informed that participation to this demonstration is voluntary. They do not have to participate, if they were not wish to do so. They could leave the questionnaire blank. Following this discussion, the lecture began. During the fifty minutes lecture, the alarm will be sounded at the specific intervals, which will be occur at 8, 15, 25, 34, and 40 minutes. Participants were asked to record dichotomously (yes/no), whether they were experiencing daydreaming at the moment or attending to the lecture content when the sound occurred. Participants were given fifteen seconds to record their response. The lecturer resumed the lecture until the lecture ends. At the end of the lecture, participants were ask to give back all questionnaire to the experimenter.

Target dates of data collection: February 7, 2014.

(Sasiporn Samartlertdee)
Student of JIPP01

Appendix B: Consent Form

**Faculty of Psychology, Chulalongkorn University**

Introduction: This research project belongs to Miss Sasiporn Samartlertdee, Miss Nopphassorn Saeneewong Na Ayudhaya and Miss Phot Dhammapeera, fourth year students of Joint International Psychology Program. With the advices from Dr. John McLean and Dr Jason Ludington, we are doing research on mind wandering which is very common in educational context. We are going to give you information and invite you to be part of this research.

Purposes: Mind wandering is considered very common in an educational context. Students often experience thoughts and find it difficult to focus on a single topic during lecture. As a result, we want to investigate some possible factors that associated with the frequency of mind wandering. We believe that you can help us by telling us if you have thought about things other than the material being presented by your lecturer.

Type of intervention: This research will involve your participation in anonymously reporting whether your mind has wandered off the lecture on several occasions during the class, and then in filling out questionnaire that will take no more than fifteen minutes.

Voluntary participation: Your participation in this research is entirely voluntary and you may withdraw from this research any time you wish or skip any question you don't feel like answering. Your refusal to participate will not result in any penalty or loss of benefits to which you are otherwise entitled to.

Benefits: There will be no direct benefit to you, but your participation is likely to provide some insight into certain intervention programme hoping to improve classroom environment and enhance students' learning.

Confidentiality: The information that we collect from this research project will be kept confidential. It will not be shared with or given to anyone except the researchers. The research intends to abide by all commonly acknowledged ethical codes. You agree to participate in this research project by filling the following questionnaire. If you have any questions, please ask the research team. Thank you for your time.

Appendix C: Instruction and Mind Wandering Frequency Recording

Part I

During the course of this lecture, you may find yourself thinking about things other than the material being presented by your lecturer. These thoughts may simply pop into your head, or you may choose to think about something other than the lecture content. In this demonstration, we are interested in both of these instances of mind wandering. For the purposes of this demonstration, mind wandering is defined as any thoughts or images that are experienced throughout the lecture that are not related to the course material being presented during the lecture. Examples of mind wandering include ‘What will I have for dinner?’, ‘I wonder what my friends are doing now?’ and ‘I hope the bus home isn't too crowded’.

Today's demonstration involves the mind wandering self-classification probe method, a method that has the ability to index the frequency of self-reported mind wandering. This method involves the instruction of what constitutes a mind wandering, the sounding of auditory probes (e.g. a beep or alarm) during the lecture and the recording of whether a mind wandering was being experienced at the point in time when the probe sounded. On this sheet you are able to record whether you are mind wandering or not whenever you hear the alarm during the course of this lecture. A total of around seven alarms will sound during this ninety minute lecture. However, you will have no prior knowledge of the times at which these alarms will occur. When you hear the alarm, please indicate on this sheet whether at the exact moment that the alarm occurred you were experiencing a mind wandering by circling “YES”. If when you heard the alarm you were not experiencing any thoughts or images unrelated to the material being presented and were paying attention to the lecture, please indicate by circling “NO”. Information regarding the specific content of your thoughts is not required. If you have questions please raise your hand.

Mind wandering Frequency Recording *(please circle your response)*

Probe	Mind wandering experienced
Probe 1	Yes / No
Probe 2	Yes / No
Probe 3	Yes / No
Probe 4	Yes / No
Probe 5	Yes / No
Probe 6	Yes / No

Appendix D: Questionnaire

Part II: Course Interest Questionnaire

Instruction: For the following questions, please circle your response for the following questions in which (1) indicates that you are strongly agree with the statement while (5) indicates strongly disagree.

1. I think the field of psychology is very interesting.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. Psychology fascinates me.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. I'm excited about psychology.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. I think what we are learning in this lecture is important.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. I think what we are studying in Dr. John McLean's special lecture is useful for me to know.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

6. I think the field of psychology is an important discipline.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7. To be honest, I just don't find psychology interesting.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8. I find the content of this class personally meaningful.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. I see how I can apply what we are learning in Dr. John McLean's special lecture to real life.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. I don't like the lectures very much.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

11. The lectures in this class aren't very interesting.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

12. I enjoy coming to this lecture.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

13. The lectures in this class really seem to drag on forever.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

14. I like my instructor (Dr. John McLean).

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Grit Questionnaire

1. I usually put a lot effort in achieving my goal

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2. I tend to give up when I fail

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3. I have difficulty in maintaining my goals

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4. I keep being distracted from my goals

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5. I don't always have a specific goal

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6. I am passionate about my work.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7. I don't like submitting work until it is perfect.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8. Work colleagues can rely on me to complete tasks effectively and efficiently.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9. After completing a project I find myself just as enthusiastic about it as when I was starting it.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10. I don't need encouragement via incentives to complete tasks.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11. I am able to remain focused over an extended period of time.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12. I find motivation in solving problems.

(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

13. I stick with my commitment to finish the work.

(1) (2) (3) (4) (5)
Strongly Disagree Disagree Neutral Agree Strongly Agree

14. I lose interest easily.

(1) (2) (3) (4) (5)
Strongly Disagree Disagree Neutral Agree Strongly Agree

15. I change my hobbies frequently.

(1) (2) (3) (4) (5)
Strongly Disagree Disagree Neutral Agree Strongly Agree

16. I believe that "hard work pays off".

(1) (2) (3) (4) (5)
Strongly Disagree Disagree Neutral Agree Strongly Agree

17. I will do whatever it takes to accomplish my goal.

(1) (2) (3) (4) (5)
Strongly Disagree Disagree Neutral Agree Strongly Agree

Demographic Information Sheet

1. Age: _____

2. Gender: M / F

3. GPAX: _____

4. What row are you sitting:

1st 2nd 3rd 4th 5th
6th 7th 8th 9th 10th

5. What is your major:

JIPP BALAC ISE BSAC INDA
BBA EBA COMMDE COMM ARTS

Other (Please specify): _____

THANK YOU! ^.^

Bibliography

Nopphassorn Saeneewong Na Ayudhaya

As a pioneer student of Joint International Psychology Program (JIPP) at Chulalongkorn University of Thailand, Miss Nopphassorn Saeneewong Na Ayudhaya successfully completed Bachelor degree in Science (B. Sc.) in 2014. As a part of a double degree program, she also received a Bachelor degree from the University of Queensland, Australia. The experiences of studying psychology has given her the opportunity to discuss what we understand and what we have yet to understand about human behaviour. She also has a strong interest in learning about humans and the application of psychology and psychological methods to the daily basis. Upon completing her education, she is currently volunteering in Bovaranives Vihara Monastery of Thailand, especially on the Royal Funeral of His Holiness Somdet Phra Nyanasamvara, The Supreme Patriarch of the Thai Sangha.

Phot Dhammapeera

Phot Dhammapeera is one of the students in the first cohort of Joint International Psychology Program at Chulalongkorn University, Thailand. She has a passion for understanding reasons and mechanisms underlying our brain, particularly our cognitive systems. She obtained her a BA from University of Queensland and going to achieve a BSc from Chulalongkorn University. As a fulfillment of the requirement of the curriculum, she had opportunities to conduct a research regarding mind wandering in an educational context and her study was selected for a poster representation at the 13th National Conference in Thailand. She understands components of psychological research,

such as methods use in a research, how to develop a psychometric, ethical issues related to the studies, and statistical analysis. In addition, she was a volunteer as a counselor in flood relief and an assistant in acrophobia research project.

Ornpapha Samartlertdee

Ornpapha Samartlertdee is a student of Joint International Psychology Program at Chulalongkorn University of Thailand. Having funded scholarship from two prestigious institutions, she spent four years indulging in psychology and had gained a wealth of experience. She received her BA from the University of Queensland as part of the dual-degree program and eventually earned her BSc from Chulalongkorn University with first class honour. As part of the curriculum, she was given opportunities to work on a research project on a topic of mind wandering and her work was selected for poster presentation during the 13th Psychology national conference in Thailand. She had developed an understanding of the methodological, practical, and ethical considerations that shape the research process, especially in statistical analyses. Apart from her education, she also volunteers as a Counselor in Flood relief center at Chulalongkorn University in 2011.